THE OXFORD GEOGRAPHIES

THE SENIOR GEOGRAPHY

BY A. J. HERBERTSON

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OXFORD GEOGRAPHIES

VOL. III

THE SENIOR GEOGRAPHY

BY

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PROFESSOR OF GEOGRAPHY IN THE
UNIVERSITY OF OXFORD

AND

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PREFACE

THE letters which the editor of this series has received in recent years from all parts of the country, and from the colonies, have induced him to plan these books. Instead of two unrelated sections of physical and political geography as in older textbooks, an attempt has been made to write a series of geographies which contains the information usually expected from candidates for preliminary, junior, and senior local examinations, and other examinations of a similar standard, on geographical and educational lines.

The first or preliminary volume was largely descriptive, and aimed at presenting definite pictures of the different regions of the globe, together with an outline of the salient topographical features.

In the second or junior book a more definitely causal treatment was aimed at, and attention was specially drawn to the interrelation between configuration, climate, vegetation, and human activities. The geography of the British Isles was selected for specially full treatment on these lines, and the inductive method was freely employed to establish general geographical truths which are taken as axiomatic in the present volume.

In this, the third or senior volume, it is assumed that pupils already possess some concrete knowledge of the world as a whole, and are familiar with the outlines of the general and economic geography of each continent. This renders it possible to proceed to the consideration of the world according to its Natural Regions. The adoption of this method of teaching furnishes a rational basis of classification and comparison in place of the ordinary irrational system

by political divisions. These in the present volume are everywhere subordinated to the natural subdivisions. The opposition between the two, however, is often merely temporary, since political divisions tend inevitably to approximate to natural divisions. For this reason it has been thought well in the present volume to call attention to the part which geographical conditions, and more particularly the geographical control of routes, have played in the history of each region.

While each of the three volumes is complete in itself and can be used independently of the others, it is probable that in many schools the three will be used consecutively. Pupils who have worked through all three will gain, as they proceed, not merely a more detailed knowledge of the geography of the World, but a gradually widening conception of geographical problems and their complexity.

A Physiographical Introduction has also been prepared which can be bought and used either independently or with the Junior or Senior Geography.

The writers have to thank Miss N. E. MacMunn, Demonstrator in the Oxford School of Geography, and Mr. E. F. Elton, of Wellington College, both of whom have been good enough to read the proofs and to make many valuable corrections and suggestions.

An edition with a statistical appendix and questions has been prepared. They have to thank Miss E. G. R. Taylor for drawing up the statistical tables. These should be used for exercises similar to those given in Mr. Unstead's *Practical Geography*. They are equally indebted to Miss F. Kirk, Head Mistress of Sleaford High School, who has drawn up the list of questions, which she has already used in connexion with the Senior Geography.

OXFORD, *August*, 1909.

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N.B.—The illustrations have been specially prepared for this series except the following, which are taken from Mr. Mackinder's *Regions of the World* series, 5, 26, 28, 29, 37–46, 53, 54, 57, 58, 60–68, 70, 71, 76 and 81. Figures 14, 15, 106 and 112 are after Sydow-Wagner.

FIG. 1. The Natural Regions of the World. For explanation see opposite page.

OXFORD
SENIOR GEOGRAPHY

THE NATURAL REGIONS OF THE WORLD.

In studying the geography of the World it is better to consider the well-marked natural regions which do not change rather than the political divisions which do. The chief types are :—

(1) Polar (*a*) lowlands, or Tundra type ;
(*b*) highlands, or Ice-cap type.
(2) Cool Temperate—
(*a*) western margin, or West European type ;
(*b*) eastern margin, or Laurentian type ;
(*c*) interior lowlands, or Siberian type ;
(*d*) interior highlands, or Altai type.
(3) Warm Temperate—
(*a*) western margin, or Mediterranean type ;
(*b*) eastern margin, or China type ;
(*c*) interior lowlands, or Turan type ;
(*d*) plateau, or Iran type.
(4) The Hot Lands—
(*a*) western desert, or Sahara type ;
(*b*) summer rain, or Monsoon and Sudan types ;
(*c*) wet equatorial lowland, or Amazon type ;
(*d*) lofty plateau, or Bolivian type.

Polar Lowlands or Tundra Type. The polar lowlands, or *tundræ*, are found in Europe, Asia, and North America. They show the effect of protracted cold. The year consists of two seasons—a long severe winter, with little or no daylight, and a short summer, during which the daylight is almost continuous. For two-thirds of the year the tundra is buried in

snow. In summer the snow melts, and the surface soil thaws for a few inches, affording nourishment for plants whose roots do not go deep. Below this marshy, waterlogged layer the ground is permanently frozen. Few plants can endure these hard conditions. The vegetation of the tundra consists chiefly of moss and lichens, mixed with low, berry-bearing bushes. In sheltered spots along the watercourses may be found dwarf trees, a foot or two high. In the extreme north even this poor vegetation disappears. To the south the tundra passes imperceptibly into woodland, in which the trees gradually become larger, more numerous, and of more varied species.

The tundra is thus ill-fitted to sustain animal life, yet it produces one animal of great importance. This is the reindeer. It lives on reindeer moss, and is able to reach it in winter by digging away the snow with its hoof. In the Old World it has been domesticated, and supplies many tribes with food, clothing, and a means of transport. In the tundra of the New World it is not domesticated, but the caribou, an animal of the same family, is hunted.

Polar Highlands or Ice-cap Type. In the polar highlands the combination of elevation and high latitude produces a still more severe climate. Greenland is a typical example. It is a lofty highland, with peaks from 5,000 to 11,000 feet high along the coast. Except for a narrow coastal strip the whole island is buried beneath a sheet of ice of unknown thickness. Only the western coastal strip is habitable. The surrounding seas are the home of seals, walruses, polar bears, whales, &c., which supply food, clothing, oil for lighting and heating, and bones and fibres for many useful purposes.

Antarctica, the lofty continent supposed to exist round the South Pole, appears to be an uninhabited Greenland, with an even thicker ice-cap.

As a rise in elevation involves a fall in temperature, the conditions of the tundra and of the ice-cap are found on the higher slopes of lofty mountains. The mountains of the British Isles are not high enough to illustrate the latter, but

on the highest the characteristics of the tundra, the dwarfing and gradual disappearance of trees and the preponderance of mosses and lichens, can be seen on a small scale.

The Cool Temperate Lands. The cool temperate lands are almost all in the northern hemisphere, where they stretch across the Old and the New World as a continuous belt immediately south of the tundra. In the southern hemisphere they include the extreme south of South America, New Zealand, and Tasmania.

The temperate lands have cool summers, and cold or mild winters. The winter cold increases with distance from the equator, and still more markedly with distance from the sea. The heaviest rainfall is brought by the westerly winds, and is deposited on the western slopes of the coastal mountains where these occur. The lowest rainfall is in the lee of the mountains, and in the interior of the continents. Wheat ripens everywhere within this area, except in the higher latitudes, and at high elevations.

Within the vast extent of the northern cool temperate lands many differences occur, depending mainly on elevation and on position with relation to the ocean.

The Western Margin or West European Type. Both in the Old and the New World there is a well marked difference between the eastern and western margins. British Columbia in North America and the western part of Scandinavia in Europe may be compared in configuration and climate. Both are mountain lands lying in the track of the westerly winds. The mountain slopes of both intercept the rainy winds and receive a heavy rainfall at all seasons, but especially in autumn and winter. In both fishing and forest industries are more important than agriculture.

Somewhat similar conditions prevail in the British Isles, in Northern France, and over much of the German Empire. These regions have a lower mean elevation, and a very diversified surface. In the continental portion the highlands are chiefly in the south, producing a relative uniformity of

temperature. The summers become hotter and the winters colder towards the east, but the climate is nowhere very extreme.

The vegetation of Western Europe has been so modified by man that little remains in a virgin state. The whole region was originally covered with forest. The hardiest forest tree is the birch, which is found higher and farther north than the conifers. Next come the conifers, the needle-like leaves of which are specialized to bear the severe winters of high latitudes or elevations. They compose the forests of Scandinavia and of the higher highlands of Central Europe. The lowland forests of Central Europe consist of broad-leaved trees, which resist the winter cold by shedding their leaves. The highlands of Western and Central Europe are still forested, a fact which explains such names as the Schwarz Wald (Black Forest), Böhmer Wald (Bohemian Forest), Thüringer Wald (Thuringian Forest), &c., all mountain ranges of Central Europe.

Over the lowlands of Central Europe the forest has largely disappeared, and agriculture is the principal occupation, except on the coalfields where manufactures are carried on. Cereals are the staple crop. Root crops include the potato, introduced from the New World, and now a universal food, the sugar-beet, largely grown in northern parts of France and Germany for making sugar, and various roots for fodder. Of fibre plants, hemp and flax are important, especially in the east. Sheep are kept on hill pastures, supplying wool, and cattle on the richer grass lands, where dairy-farming is important. The manufactures are principally of iron and textiles.

In the southern hemisphere are the undeveloped and densely-wooded south-west of Chile, which may be compared with British Columbia; the Falkland Islands, which may be compared with the Hebrides; Tasmania, a sheep-shearing, fruit-growing land; and New Zealand, which is partly pastoral and partly agricultural.

The Eastern Margin, or Laurentian Type. The chief difference between the eastern and western margins of the cool temperate lands is that in the former the winters are much colder, and the rainfall not so abundant. Eastern Canada in the New World may be compared with Amuria and Manchuria in the Old World. The rivers and harbours are icebound in winter, except on the southern margin. Eastern Canada is the most developed of these lands. Much of it is still covered with forest. In the cleared areas agriculture, dairy-farming and fruit-growing are carried on. The forest industries are very important. Lumber, or unworked timber, is floated down the rivers, to be sawn by water power at such lumber centres as Ottawa. Manufactures are growing. Many of them work up timber, either into wood-pulp and paper or into joinery. The coastal fisheries are important.

Amuria is in an earlier stage of development. Its forests are the home of tribes who live by hunting. Manchuria has fertile plains and valleys, in which agriculture is carried on by Chinese farmers.

In the southern hemisphere the southern part of Argentina belongs to this type. It has a smaller rainfall, and is as yet little developed.

The Interior Lowlands, or Siberian Type. Both in the Old and New World the interior consists of a vast lowland crossed by great rivers. The climate is extreme, the winters being long and severe, and the summers hot. The rainfall diminishes rapidly, becoming very scanty towards the west in the New World, and to the east in the Old World. The rain falls chiefly in summer.

The zones of vegetation are well marked. Immediately south of the tundra is a poor subarctic woodland, passing gradually into fine forests of conifers, known in Siberia as *taiga*. These thin out in the south and pass into grass lands, in which trees are rare. These grass lands, or *steppes*, stretch across Eastern Europe, and across Asia to the highlands of Eastern Siberia. They have long been the homes of pastoral peoples possessing

domesticated animals, who follow their wandering herds hither and thither, and obtain from their produce all the necessaries of life. In North America the steppes are called prairies. At the time of the European discovery they were the home of countless herds of bison, which were hunted by Indian tribes. White settlement exterminated both hunter and game. Agriculture, which had been practised to some extent by the original inhabitants, has been pushed westward as far as the increasing dryness of the climate allows. Much of the west is too dry for cereals, and is better suited for stock raising.

The Siberian lands of the Old World are going through these stages of development. Wheat has replaced natural grasses over vast areas, but, as in the New World, its extension is checked by the aridity of the interior.

Lands of the Siberian type occur only in the centre of large continents. There are, consequently, none in the southern hemisphere.

The Interior Highlands, or Altai Type. Both in the Old and New Worlds lofty mountain areas occur in the interior of the continents. In the Old World they consist of the Altai and other highlands of Siberia. In the New World they lie considerably nearer to the sea, and form part of a great mountain system which runs the whole length of America. The rainfall is heaviest on the northern slopes in Asia and on the western slopes in America, and these are forested. The leeward side is drier and barer. Above the forest line come grass lands, succeeded by vegetation of the tundra type, which ceases entirely at the snow-line. These highlands are rich in minerals, which are extensively worked in the New World, and to a slight extent in Siberia. They present great hindrances to communication, though railways have been carried across the mountain barriers in the New World. Agriculture is possible only in the valleys. Hunting is still the chief resource in the Siberian area, as it used to be in the American. The population is scanty.

The Warm Temperate Lands. The warm temperate

lands of the northern hemisphere form a continuous belt across the New World. A similar belt across the Old World is interrupted by a wedge of the highest land in the World. In South America they form a broad belt across the tapering continent, and they are well marked in South Africa and Australia.

The warm temperate lands have warmer summers than the cool temperate lands, and warmer winters, except in regions of high elevation or in the interior of continents, where the climate is of the most extreme type, the summers being oppressively hot, the winters bitterly cold. The rainfall varies in amount and season. In the west the rains fall in winter, in the east in summer, while the interior is almost rainless.

The warm temperate lands have an enormous range of products. Maize, millet, and rice tend to replace wheat, except on the high ground. Cotton, the most important of fibre plants, does well in the hotter parts, and silk, the product of silkworms which are fed on mulberry-trees, is also a characteristic product. The higher pastures supply wool and fine varieties of hair. The number of palatable and nourishing fruits is very great. Oil-producing plants, of which the olive is the most valuable, are also characteristic of the region.

The Western Margin, or Mediterranean Type. The Mediterranean lands have warm summers, mild winters, and winter rains, that is, rains in the winter half-year. The chestnut and the walnut are characteristic trees of the higher, wetter parts, and evergreen oaks of various species of the drier parts. A thorny evergreen scrub is common in the Mediterranean basin. For summer crops irrigation is generally necessary. Many of the characteristic Mediterranean plants—the olive, fig, mulberry, orange and apricot among fruits, rice, cotton, and the deep-rooted lucerne—are of Asiatic origin. The date was introduced from Africa, maize and tobacco from the New World. The olive was grown in Sicily many centuries before the birth of Christ. The vine is of equal or greater antiquity. Grapes are made into wine except in the

Mohammedan countries, where religious scruples forbid it. Traces of this feeling remain in Spain, where grapes are extensively dried into raisins, and perhaps in Greece, where a smaller variety is dried into currants. The orange is a later comer and was not cultivated in Italy till about a century before our era. The fig is important in the Levant.

In North America a broad belt of mountains borders the west coast, and the Mediterranean type is found only in the Californian valley, which will produce whatever can be grown in the Mediterranean. Wine is becoming an important product. Irrigation is generally necessary.

The central part of Chile in South America, the western part of Cape Colony in South Africa, and the south-west of West Australia, the south of South Australia and Victoria, belong to the same type. In all attention is being paid to the cultivation of Mediterranean products, especially the vine.

The Eastern Marginal Lands, or China Type. The eastern marginal lands of the warm temperature belt receive summer rains. The climate is extreme, the summers being hot and the winters extremely cold. In the north of China, in the latitude of Italy, the rivers are frozen in winter. In the forests walnut and other trees flourish, and there is an undergrowth of evergreens of camellia and laurel type, recalling the evergreen scrub of the Mediterranean region.

In the north cereals and pulses are grown as an early crop, while the summer crops include sugar, indigo, rice, and cotton. Tea, on well-drained hill slopes, is important farther south. In the extreme south tropical plants, such as the banana, appear. The opium poppy and the mulberry for silkworms are widely grown.

Japan belongs to this type, though winter rains also occur in the south and west, which have a fairly uniform rainfall all the year round. In North America, a similar region, of about the same extent as in Asia, with hot summers, cool winters, and summer rains, extends from the Atlantic coast to the Missis-

sippi: maize, tobacco, cotton, and rice are staple products.

Natal and the eastern part of Cape Colony, and Eastern New South Wales and Southern Queensland, belong to this type. There is one important difference, however, for the winters in these southern regions are very mild. The crops of China and the eastern United States will be grown as their development advances.

The Interior Lowlands, or Turan Type. This type is represented in Central Asia by a vast area stretching from the Black Sea far into the heart of the continent, in North America by a smaller area extending roughly from 100° W. to the western mountains, and in South America by much of Argentina. In consequence of their position in the interior of the continent, all have a very extreme climate and a scanty rainfall.

In the New World these dry lowlands are chiefly used for stock raising. In the Old World, where the aridity is more intense, they are little better than desert, except in the irrigated areas, where fruits and cereals of the Mediterranean type are grown. In Russian Central Asia much attention is being paid to the cultivation of cotton.

The Plateau, or Iran Type. A broad belt of plateaus stretches across temperate Asia from the Mediterranean to the frontiers of China, interrupted by still loftier mountains. The rainfall is extremely scanty, and the climate is very extreme. The only fertile parts are the valleys leading into the mountains, and such districts as can be irrigated from the mountain streams. Even here vegetation is never luxuriant, and travellers have remarked that plants grow quite separate, no one touching another. Wherever water can be brought cereals are grown, and such fruits as the apricot, peach, almond, &c.

The corresponding area in North America consists of lofty mountain ranges, enclosing plateaus of extreme aridity, which are very thinly settled.

The plateau of Mexico lies partly within the tropics, but its

elevation gives it a temperate climate, except on the coasts, where the climate is moist and very hot, and the vegetation is tropical. On the plateau, at various elevations, rice, sugar, cotton, coffee, and cacao are grown under irrigation, with maize, wheat, tobacco and fruits still higher. The unirrigated parts of the plateau are covered with dry, thorny plants, forming a poor pasturage, best suited for goats. Henequen, a fibre plant, and cacti of different varieties are characteristic plants of the drier parts.

The Hot Lands. The occurrence of seasonal rains, which we have already seen in the Mediterranean lands (winter) and China (summer), becomes extremely well marked in the hot lands. Rain falls only in the summer months, and the year is divided into a wet and a dry season. The rain belt follows the sun north and south, crossing the equator twice, and near the equator, though rain falls at all seasons, the year has two relatively wet and two relatively dry seasons. In the trade wind area rainless regions occur as these winds are moving from colder to warmer latitudes, and are consequently dry.

In the tropical lowlands the temperature is high at all seasons, but on the higher parts the climate may be extreme. The range of products is consequently large, as the products of each belt can be grown at a suitable elevation.

The West Tropical Deserts, or Sahara Type. A band of rainless desert, varying in size with that of the land mass, is found round the tropics on the western side of all the continents in both hemispheres. It is best marked in Northern Africa and Arabia, where the Old World is very broad. A smaller desert is found in the north-west corner of India. In the corresponding latitudes of North America the continent is tapering, and the desert area is comparatively small. In the southern hemisphere are the Chile-Peru desert of South America, the Kalahari in South Africa, and the great western desert of Australia. All these lie in the track of the trade winds.

The Sahara, or North African desert, has a very varied surface. It rises gradually to the south, and is traversed from north-west to south-east by a belt of loftier tableland. Much of the surface consists of sand dunes. Elsewhere there may be a thin covering of thorny scrub. The absence of vegetation allows the exposed surface to become intensely heated during the day, and rapidly cooled during the night. Hence the range of temperature between day and night and between summer and winter is very great.

Water is often stored in the lower layers of the soil, and can be reached by sinking wells. Irrigation then becomes possible, and an oasis, or fertile area, is formed. The oases are thickly planted with palms. Beneath their shade cereals, pulses, and fruits are grown. The characteristic animal of the desert is the camel, which lives on the thorny scrub. In the better parts sheep and goats are kept by wandering herdsmen. The oases are inhabited by a settled population, who carry on some manufactures. Trade is carried on by caravans of camels, which cross the desert by well-known routes from well to well and from oasis to oasis.

The Arabian desert is a continuation of the Sahara, from which it is separated only by the narrow Red Sea. The valleys are cultivated under irrigation, but the interior consists of salt or sand deserts, crossed with difficulty by camel caravans. The Indian desert is similar in character.

The North American desert consists of alkaline plains, with a scanty vegetation of cactus, yucca, and other thorny plants. Some varieties of yucca store water ; others bear a fruit resembling the date in flavour. Wandering Indian tribes feed on the various desert plants and animals.

The desert of Chile and Peru resembles that of North America. Large deposits of nitrates are of great commercial value.

The Kalahari desert is a stony, sandy desert. Large areas are covered with poor grass and thorny desert vegetation.

The Australian desert occupies much of the interior. In

the barer parts it is sandy or stony and without vegetation. Thousands of square miles are covered with spinifex, a prickly plant useless for pasture. The summer heat is very intense, and the range between day and night and between winter and summer is very great. Certain plants store water in their roots, a fact well known to the wandering native tribes.

The Monsoon and Sudan Types. Monsoon lands have outflowing winds in winter, the dry season, and inflowing winds in summer, the wet season. These seasonal winds are called monsoons. India is the typical monsoon land. The north-east or dry monsoon blows from October to April, and the south-west or wet monsoon from the Indian Ocean from April to September. Violent storms occur at the change of monsoon. At uncertain intervals the monsoon brings little rain, and famine results. Heavy rains fall on the seaward slopes of the Western Ghats. In the east the wet monsoon is drawn north over the Bay of Bengal and north-west along the Ganges valley, but brings little rain to the rest of the peninsula. In south-east India the north-east trades bring winter rains after crossing the Bay of Bengal. The wetter mountain slopes are densely forested. Rice is grown in the swamps round the river deltas. Wheat is grown under irrigation as a winter crop chiefly in the Punjab. Millet is the cereal on the drier plains. Cotton, tea on well-drained hill slopes with a sufficient rainfall, tobacco, the opium poppy, indigo, sugar, jute, and many other industrial plants are cultivated. There is thus considerable resemblance between the products of India and of Southern China, which is on the monsoon fringe. In Ceylon the vegetation is tropical. The coco-nut palm fringes the sea. The dense forests produce cinnamon and other spices and the bamboo, a valuable grass. On the highlands tea and coffee are grown.

The Indo-China peninsula has forested highlands and swampy lowlands, which grow rice. Teak, a valuable hard timber, grows in the forests of Burma. The bamboo supplies materials for furniture and domestic utensils. Many Indian crops are

being introduced into those parts of the peninsula which are under British and French control.

Central America and the Guiana lowlands are included in the region of summer rains. The eastern coasts of Central America have rain all the year round, but especially in summer. The western have a well-marked dry season in winter. The products vary with the elevation. The *tierra caliente*, or hot zone, up to 3,000 feet, produces luxuriant forests, containing mahogany, logwood, palm, and bamboos. The many tropical fruits include the banana and the pineapple. Cacao, which requires a high temperature, abundant moisture, a rich, deep soil, and shade from the scorching rays of the Sun, is cultivated under the shade of bananas. Sugar is an important cultivated crop in the hot lowlands, both of Central America and of the Guianas. Coffee, which requires somewhat similar conditions, can be cultivated to higher elevations, and is also found in the lower part of the next zone. In the *tierra templada*, or warm temperate zone, from 3,000–6,500 feet, are grown the fruits and cereals of the temperate lands at suitable elevations. Maize is the most important cereal. Still higher and cooler is the *tierra fria*, or cool zone, suitable for the fruits and cereals of northern lands. The products of the West Indies are similar in character, but vary somewhat from island to island.

In Africa most of the inter-tropical region consists of lofty plateaus, rising above the tree-line only in the higher mountain areas, but too high for the growth of the dense forests which cover the lowlands. There is a very heavy summer rainfall. The range of temperature varies with the elevation. In the low plateaus there is little difference between winter and summer, but on the higher plateaus the winters are cold. The vegetation is of the *savana* type, well seen in the Southern Sudan. This is a grass land, diversified with clumps of trees, which give a park-like appearance. The gigantic baobab is very common. Except where the tse-tse fly is found, the savanas are suitable for cattle keeping, and are the home of pastoral tribes. Wheat and millet are grown

at varying elevations. The cultivation of coffee and cotton is increasing.

In South America savanas are found in Northern Colombia, Western Ecuador, the Orinoco basin, and the highlands of Guiana. In Colombia and Ecuador the *tierra caliente*, *tierra templada*, and *tierra fria* are well marked. Above 10,000 ft. are the *paramos*, too high for the growth of trees or the cultivation of any cereal, except barley, which does not always ripen. On the lowlands rice, bananas and tropical fruits, cacao and sugar are grown. Coffee, cereals and fruits are grown in the temperate zone. In the savanas east of the Andes cattle-rearing is important, as well as in the *llanos* of the Orinoco and in the savanas of the western lowlands.

The *tierra templada* has temperate products. On the plateau of Quito, in the *tierra fria*, at a height of 9,000 feet, cereals are grown for local use, but this is near the upper limit of cultivation.

Much of Brazil outside the Amazon basin is a savana land. The *campos* and *pampas* of the Plate basin are great cattle-rearing regions. On the highlands coffee, sugar, and cotton are grown. The coastal lowlands are densely forested.

The northern part of Australia is a savana region. In the lower lands the banana, pineapple, and other fruits, sugar, coffee, cotton, &c., are grown.

The Equatorial Lowlands or Amazon Type. The equatorial lowlands occupy vast areas in the Amazon basin of South America, and on the Guinea coast and in the Congo basin of Africa. The temperature is high at all seasons, and rain falls throughout the year, with two relatively wetter seasons at the equinoxes. These lowlands are covered with dense primaeval forests, remarkable for the numerous species of trees, and for the eager struggle for light and air which goes on. Tree grows upon tree, their roots and foliage intermingling. Creeping plants climb foot by foot up the trunks of forest giants, to flower amidst their topmost branches. Parasitic plants take root wherever a hold can be obtained,

and below, in the warm mud, fungi and other humbler plants breed in obscurity. The dense roof of branches shuts out the Sun above, while below the undergrowth itself attains the dimensions of a forest. The whole is intersected by innumerable creeks and waterways, feeders of the great rivers which in the rainy seasons form veritable inland seas. Of the resources of these tropical forests little is yet known. The trees of commercial value are rubber in the Amazon and West Africa, gutta-percha in the East Indies, the oil palm of the Guinea coast, and cabinet woods such as ebony, mahogany, and satinwood. The native tribes live by hunting and fishing, and practise rude agriculture.

Tropical forests of similar character cover the Malay peninsula and the islands of the Malay archipelago. Their inhabitants are extremely backward. In the Dutch islands agriculture has been developed, especially in Java, where coffee, sugar, and other tropical products are cultivated. Spices are obtained in great quantities from the forests. The sago palm is the chief food plant of the native tribes.

High Plateaus, or Bolivian Type. The west coast of South America, from the equator to south of the tropic of Capricorn, is bordered by the Andes, which rise in the plateaus of Peru and Bolivia to a height of 10,000 or 12,000 feet, with peaks in the surrounding ranges of 20,000 feet. Though lying close to the equator these lofty regions are tropical only on the lower slopes. The plateau climate approximates to that of the hot or cool temperate lands according to the elevation. The three zones already described are well marked. The Bolivian plateau may be taken as typical. The valleys are fertile, but irrigation is necessary. Sugar and wheat grow side by side. Cotton, maize, melons, wheat, barley, and potatoes are grown according to the elevation. On the *puna*, or highest part of the plateau, the climate is very extreme, the nights being cold at all seasons. Large herds of cattle, llamas, vicuñas, and sheep are kept. In the forests of the eastern slopes of the Andes, which do not belong

to the plateau proper, the cinchona tree is abundant, supplying quinine.

The higher plateaus of Colombia and Ecuador belong to the same type.

In Asia the plateau of Tibet is a somewhat similar region of high elevation, but farther from the equator. The northern part is an uninhabited region of lofty mountains rising above the snow-line and enclosing desolate valleys. The population is concentrated in the valleys of Southern Tibet, the highest inhabited region in the world. The winters are long and of intense severity; the summers are hot. Much of the country consists of glaciers and snow-fields. The remainder supplies poor pasturage for yaks. In the sheltered valleys barley and pulses are grown under irrigation. The summers are hot enough to ripen the peach and apricot, which, with the mulberry, are found high up in many of the mountain valleys of Central Asia.

Summary. Hard and fast lines cannot be drawn between these regions. We compare Ecuador with the Sudan, but the comparison is only broadly true for the savana regions. The highest parts are to be compared with Bolivia or Tibet, and the forests of the lowlands, or of the eastern slopes of the Andes, with those of the Amazon. Even in equatorial lands the conditions of the tundra, and of the polar ice deserts may be found, if the land is high enough. The paramos of the equatorial Andes pass into tundra, and finally into glacier and snow-field.

At the present time, with modern facilities for transport, the peopling of the Earth by Europeans is proceeding rapidly. The science of tropical medicine is combating the belief that certain regions are necessarily the white man's grave. By the close of this century Europeans will probably have settled many tropical and equatorial lands which are at present too thinly peopled for the development of their immense resources. A scientific study of the natural regions of the world would greatly simplify their task, and would save many failures.

Unconsciously we already think of the World in regions, and try to apply to one part the experience gained in another. The extension of cotton-growing in the Niger basin, or of tea in Natal, are examples of this process.

THE MEDITERRANEAN REGION.

Area. The lands bordering the Mediterranean are in three continents and under divided political control, but they present such marked resemblances, and are so definitely separated by mountains and deserts from the rest of these continents as to form a natural geographical region.

The Mediterranean, the largest inland sea of the World, is almost landlocked. Its greatest breadth is between 500 and 600 miles, but at the Strait of Gibraltar, through which it communicates with the Atlantic, it is only nine miles across. From this strait to the Syrian coast it is about 2,200 miles long. In the north-east it communicates through the Dardanelles with the Sea of Marmora, and thence with the Black Sea and the Sea of Azov. Including these, its area is over 1,000,000 square miles; excluding them about 900,000 square miles.

The Mediterranean is divided into two very different basins by the peninsula of Italy and the island of Sicily (see Figs. 2 and 3).

The Western Mediterranean. The western basin is surrounded by a wall of mountains, in which there are only a few narrow breaks (Fig. 2). Above its southern shores rise the Atlas, separated by the Strait of Gibraltar from the Betic Mountains or Sierra Nevada of Iberia. The mountain girdle is continued north by the Catalonian Mountains and by the eastern end of the Pyrenees. Beyond this occurs the first important break. The Central Plateau of France does not quite reach the sea, which curves northwards as the Lion Gulf. Two routes lead inland, one between the Pyrenees and the Central Plateau by the Gate of Carcassonne, the other

between the Central Plateau and the Alps by the narrow Rhone valley. The Alps, the highest and broadest part of the mountain barrier separating the Mediterranean from Northern Europe, and the Apennines enclose the rest of the basin. The Apennines are lowest where they join the Alps, and low passes lead north from the Gulf of Genoa, the second great gulf of the Western Mediterranean, to the plains of the Po, and the head of the Adriatic Sea. A volcanic forcland, with Vesuvius, Etna, and other active volcanoes, skirts the western side of the Apennines in the south.

FIG. 2. The Western Mediterranean. The mountainous lands are shown in black, deep seas in light shading. The scale is the same as that of the map in Fig. 3.

A narrow rift, the Strait of Messina, has cut off Sicily, which is separated from Africa by the wide but shallow Strait of Sicily or Tunis, 100 miles across.

Five natural ways lead out of the Western Mediterranean, the Straits of Gibraltar, Messina, and Sicily, and the land routes by the Gate of Carcassonne and the Rhone valley. Less important routes are by passes across the Catalonian Mountains to the Ebro valley, and across the Apennines from Genoa to the Po. (Identify these in Fig. 2.)

The islands of the western basin are the Balearic Islands

in the west and Corsica and Sardinia in the centre, the latter almost dividing it into two parts.

The Eastern Mediterranean. The larger eastern basin lies farther south. It is cut into great gulfs. The mountain barrier is not continuous in the north, and does not exist in the south (see Fig. 3).

The Adriatic Sea, a depression between the Apennines and

FIG. 3. The Eastern Mediterranean. The mountainous lands are shown in black, deep seas in light shading. The scale is the same as that of the map in Fig. 2.

the Dinaric Alps, ends in the plain of the Po. From this routes open (1) across the high Alps to Central Europe, (2) across the lower Alps to the Hungarian plain, and (3) across the Apennines to the Western Mediterranean.

The Aegean Sea, studded with islands, cuts Greece and Asia Minor into many small peninsulas and bays, which form excellent harbours. It leads to the Vardar and Maritsa

valleys in the north, from which the routes to the Danube and Central Europe are not difficult. The mountains enclose many small, isolated, intermont plains, which are the populous parts of these regions.

The Dardanelles, the Sea of Marmora, and the Bosporus lead to the Black Sea, which is deep in the south and shallow in the north, where its floor rises gradually to the plains of Eastern Europe. The Crimea peninsula almost separates it from the Sea of Azov.

Between the Black Sea and the Levant, the eastern part of the Eastern Mediterranean, is the lofty plateau of Asia Minor, bordered by the Pontic Mountains in the north and the Taurus in the south. Crete and Cyprus are remnants of a submerged range farther south. The routes to the plateau are by valleys opening to the Aegean. In the extreme south-east the Iskanderun gulf of the Levant leads to the Cilician plain and the pass of the Cilician Gates across the Taurus. Another route leads by Aleppo to the Euphrates and the plains of Mesopotamia.

The eastern and southern shores of the Eastern Mediterranean are very unlike the deeply-cut, island-studded northern shores. Above them rise the steep escarpments of the Syrian and African tablelands, fringed in the east by low coastal plains. The shores are destitute of islands, and broken only by the gulfs of the Greater and Lesser Syrtes. Northern Africa is a desert, except in the fertile Nile delta. An eastern exit from the Eastern Mediterranean, comparable with the western exit by Gibraltar, has been made by cutting a ship canal across the isthmus of Suez to the Red Sea.

The Mediterranean Lands, therefore, consist of highlands, coastal lowlands, and intermont plains. Their climate and products have already been described (see p. 7). The political divisions are numerous. Many languages are spoken. The religion is Christian in Europe, except in Turkey, and Mohammedan elsewhere.

Ease of Navigation. The Mediterranean peoples have

always been sailors, especially in the eastern basin, where good harbours are fairly numerous and the peninsulas and islands tempt the sailor onwards. The regularity of the winds and currents in both basins made it easy to master the navigation of the whole sea. The drawbacks are frequent storms, the absence of estuaries, and the silting up of harbours, especially in the dryer east. At the end of long droughts, when the rivers are swollen by heavy rains into fierce torrents, the dry soil, with little vegetation to bind it, is carried down the hill sides and out to sea as silt. Ephesus, once a great port, is now five miles inland, and Smyrna has only been saved by costly engineering works.

Historical Summary. The geography of the Mediterranean has largely determined its history. Much has always turned on the command (1) of the strait between the two basins, and (2) of the Levantine starting-points of the routes to the east.

The narrow coastal strip on either side of the Orontes was early settled by the Phoenicians. Forested mountains prevented expansion inland, but supplied metals, in which the Phoenicians became skilful workers. Unable to depend on agriculture alone, they became shipbuilders and traders, thus utilizing their maritime position and the timber supplied by the forests. Their trade was very varied. A mollusc found on their coasts supplied the famous Tyrian purple, which was in wide demand. To obtain copper and tin, of which they made bronze, they visited Cyprus, so called from its copper, and the tin mines of Spain. Later they passed through the Strait of Gibraltar, and reached the tin mines of Britain and the amber lands of the Baltic. The position of Tyre, the Phoenician metropolis, where the routes from the Mediterranean and the routes from Asia converge, made it the emporium at which the produce of east and west were exchanged.

As population and wealth increased colonies were founded along the Mediterranean. Of these Carthage, on the peninsula

of Tunis, which irrigation renders very fertile, was the greatest. Enriched by agriculture as well as commerce, its position gave it the command of both basins and the presumptive supremacy of the western.

The plains and wooded highlands of Palestine, south of Phoenicia, were settled by the Israelites, who under better natural conditions remained an agricultural and pastoral people, with no incentive to oversea expansion.

The Greeks entered the Balkan peninsula from the north and spread from the plains of Thessaly to the intermont plains of the south, the Aegean islands, and the coast of Asia Minor. The isolation of the plains and valleys of Greece hindered the growth of a united nation, and each city state was independent. The conditions of Phoenicia were thus in some degree reproduced for each city, and the Greeks became a maritime and trading people, planting colonies on all the sea routes open to them. Many of these, notably Marseille and Alexandria, are still flourishing cities.

Carthage and the Grecian colonies naturally came into collision. The struggle was for Sicily, the key of both basins. Before its close a new Mediterranean power, well-placed for the control of both basins, came on the scene. This was Rome.

Rome and Carthage fought out their struggle at many points round the western basin, where Carthaginian colonies were numerous. The death-blow was struck at Carthage. Possessing it and Sicily, Rome controlled the Mediterranean, and the Roman arms rapidly penetrated all the natural routes opening from it. Rome remained the capital so long as the Empire coincided with the Mediterranean, but later a second capital was founded at Constantinople, the gate of Asia. This contributed to the decay of the Western Empire, out of which modern Europe has been formed.

The next great power was that of the Saracens, or Mohammedan Arabs, who became masters of the southern and eastern shores, which still remain Mohammedan, and long held Spain

on the northern shores. The Crusades failed to dislodge them, but promoted intercourse between the Eastern and Western Mediterranean.

A favourable geographical position led to the rise of Genoa and Venice, which commanded Mediterranean routes and land routes across the Alps. Both powers declined after the Turkish conquests of the fifteenth century closed the routes to Asia and the discovery of the Cape route led to the rise of Atlantic ports.

The opening of the Suez Canal made the Mediterranean once more the great highway between east and west. Venice and Genoa have recovered something of their mediaeval prosperity. The continental powers north and east of the mountain barriers are eager for Mediterranean possessions, and are directing their European policy to this end.

SYRIA AND PALESTINE.

Configuration. Syria is a tableland, crossed from north to south by a great rift valley. This is drained by the Orontes and Leontes, flowing to the Mediterranean, and by the Jordan, flowing to the Dead Sea, which lies 1,300 feet below sea-level, and is 1,300 feet deep. The rift valley is continued by the Gulf of Akaba and the Red Sea.

West of the rift valley the high margin of the tableland comes close to the sea, rising to over 10,000 feet in the mountains of Lebanon. Farther south it recedes from the coast, leaving the fertile plains of Sharon and Philistia.

East of the rift valley, to which the tableland falls steeply on either side, the highest part forms the mountains of Anti-Lebanon, with Damascus at their base. Connected with the rift is the great volcanic outflow of the Hauran, on the margin of the Syrian desert. Fine wheat is grown in its fertile, volcanic soil. The tableland slopes east to the Euphrates, forming the Syrian desert.

The coast is rocky in the north and sandy in the south, whither the Nile silt is carried. The ports are Iskanderun, or Alexandretta, in the north, from which a route leads through the Syrian Gate to Aleppo; Beirut, from which a railway runs to Damascus; Haifa, with a branch line to Damascus by a depression in the mountains of Samaria; and Jaffa, with a railway to Jerusalem, near the culminating point of the western tableland.

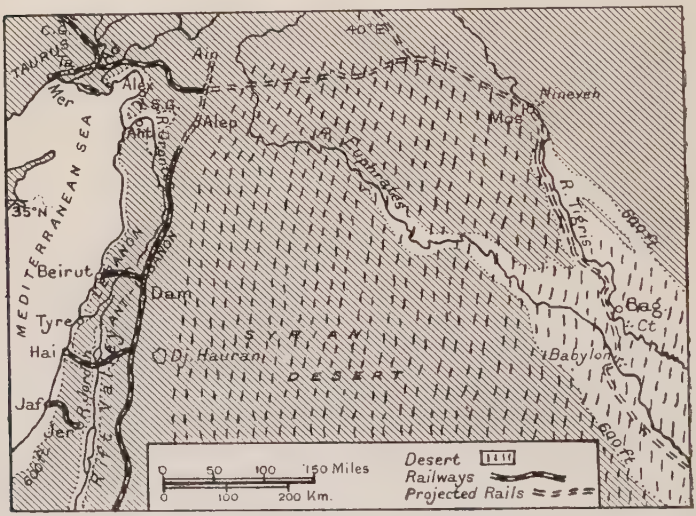


FIG. 4. Syria and Upper Mesopotamia. The land over 600 feet is shaded, the desert area is dotted.

Climate and Products. On the Mediterranean slopes and on the hills of Gilead, beyond Jordan, the rainfall is sufficient for agriculture. The climate is that of Southern Europe. The plains make rich wheat lands. The vine, olive, and fig are grown on the hills, but the old careful terrace cultivation has fallen into decay. The climate of the Jordan rift is very hot. Jericho, on the main eastern route from Jerusalem, is still surrounded by palm trees and groves of bananas

and oranges. East of Jordan the summer heat increases, and the rainfall diminishes. The country is poor grass land, passing into desert. Ruins of cisterns, tanks, and cities show that it was once irrigated and cultivated. It is now the home of wandering Arab tribes, who keep camels, sheep, and goats.

Damascus, the capital of Syria, is an oasis irrigated by the Abana, at the base of Anti-Lebanon. It is the starting-place of routes (1) by Galilee to the Levant and the Nile, (2) across the desert to Baghdad and the Persian Gulf, and (3) by the pilgrim route to Mecca. A railway following the last route is nearly completed.

Historical. Syria, the natural highway between the Nile and the Euphrates, has been repeatedly seized by invaders from both sides. In ancient times it was highly cultivated and thickly peopled. Its importance declined after its conquest by the Turks, who neglected agriculture and allowed the irrigation system to fall into decay.

ASIA MINOR.

Configuration. Asia Minor, forming the Turkish provinces of Anatolia and Kurdistan, is a plateau which rises gradually from the Aegean in the west to over 6,000 feet in the Armenian plateau in the east. Its mountains and rivers, and consequently its routes, run from east to west. In the north it is bordered by the Pontic mountains, which descend steeply to the Black Sea. In the south the Taurus rise to 10,000 feet, receding from the sea only round the Gulfs of Adalia and Iskanderun, beyond which are the plains of Pamphylia and Cilicia. In the east the Anti-Taurus runs north-east, and beyond lies Armenia.

The rivers of Asia Minor flow in long valleys, running east and west. In their lower courses they break north or south across the mountains in deep gorges. In the north the

Kizil Irmak and the Sakaria flow to the Black Sea. In the east, flowing from Armenia, where the northern and southern mountains of Asia Minor converge, is the Euphrates, which breaks south across the mountains to the plains of Mesopotamia.

Routes. The routes from the northern or southern seas to the central plateau are all difficult, for the lower courses of the rivers are useless either for routes or for navigation. This neutralizes the advantage of the position of Asia Minor between the Black Sea and the Levant. The Cilician Gate across the

FIG. 5. Asia Minor, showing the general arrangement of the ranges and the position of the chief towns.

Taurus, the only practicable route from the south, has always been of great importance.

In the west the plateau is lower and more accessible. Its average elevation is about 2,500 feet, though Olympus rises to 7,500 feet. Broad longitudinal valleys opening from the Aegean form natural routes, the most important being those of the Gediz and the Menderes.

The marginal mountains arrest the rainfall, and the interior is a region of salt plains, marshes, and lakes, and of deserts and poor steppes. Routes pass either to the north or the

south of this desert region. From Skutari, on the Bosporus, a railway runs by the Sakaria and a tributary to Angora, whence the northern route goes by the upper Kizil Irmak and the upper Euphrates to Erzerum, in Armenia. From Erzerum routes cross the mountains to Trebizond, on the Black Sea, run east to the Caspian by the Aras and Kur valleys, and south-east to Tabriz and Teheran, in Persia. From Smyrna, the chief port of Anatolia, at the head of a deep gulf, railways follow the Gediz and Menderes valleys, sending a branch to Angora. The main route south of the central deserts goes by Konia to Kaisariye, at the foot of Argaeus, a volcanic cone (11,800 feet), whence easy passes lead across the Anti-Taurus. From Konia the railway is being carried to the Gulf of Iskanderun, and will probably be continued by Mosul and Baghdad to the Persian Gulf.

Armenia is a higher plateau drained by rivers flowing in long, broad valleys. Three large depressions contain lakes—Gokcha, drained to the Aras, and Van and Urmi without outlets. Politically Armenia is divided between Russia, Persia, and Turkey, the frontiers meeting at the lofty volcanic cone of Ararat (17,000 feet).

Climate and Products. The climate of the interior is extreme and dry. The seaward slopes of the marginal mountains are densely forested, especially towards the Black Sea. With irrigation the plateau is extremely fertile. Wheat is grown round Sivas. The vine, olive, fig, orange, maize, rice, opium, tobacco, cotton, and the carob are grown in the valleys and exported through Smyrna. Of these products the most important are tobacco, round the northern rivers and in the north of the Syrian coast, fruits, especially figs, in the western valleys, and silkworm culture near the Sea of Marmora, round Brusa. The central plateau pastures sheep and goats, those of Angora being famous. The wool is manufactured into Turkey rugs and carpets. In Armenia there is a constant struggle between the settled Armenians, engaged in agriculture and trade, and the nomadic pastoral Kurds.

Historical. In Greek times Asia Minor was a rich agricultural region, with flourishing cities, skilled in the arts and literature. The routes across it gave it great commercial importance. Under the Romans its prosperity continued. Its decline began with the westward movement of the nomadic peoples of Central Asia, represented to-day by its Turkish conquerors. Irrigation and agriculture, like the roads, fell into decay and have never recovered.

The Islands of the Aegean. These vary from bare rocky islets to fertile islands producing Mediterranean fruits. Sponge fishing is important. The principal islands have sea communication with the ports of Greece and Asia Minor. Samos and Mitylene are fertile and prosperous. Rhodes, one of the largest, was formerly the centre of an important maritime power.

Cyprus, a British protectorate, was anciently famous for copper. Its forests were cut down for smelting and ship-building, leaving its limestone hillsides bare and infertile. The capital is Nikosia.

THE BALKAN PENINSULA.

Configuration. The Balkan Peninsula, like Asia Minor, has mountains round its margin. The Dinaric-Albanian-Grecian mountains in the west form a barrier to the Adriatic, and in the north the rounded, forested Balkans form a barrier to the lowlands of the lower Danube. These converge to the north, and diverge south and east, so that the natural slope of the land is to the Aegean and Black Seas.

In the intermediate region four valley lines are important, the Vardar and Struma, opening from the Aegean; the Maritsa, whose lower valley also opens from the Aegean, but whose middle and upper course, as well as the valleys of its chief tributaries, run east and west; and the Morava from the Kara

Dagh, opening north to the Danube between the Dinaric and Balkan mountains where these approach each other most closely.

The Vardar-Morava valley line forms the main north and south route between Salonica, built east of the marshes through which the Vardar reaches the sea, and Belgrad, at the confluence of the Danube and the Save. The Struma valley is parallel to the Vardar section of this route, but is blocked to the north by the wildest part of the Rhodope or Thracian Highlands, where the Muss-alla and Rilo Dagh rise to nearly 10,000 feet above the sources of the Maritsa and the Isker. This is sometimes called the Bulgarian knot. The depression between it and the Balkans, with Sofia, the capital of Bulgaria, in the centre, is drained north across the Balkans by the Isker, whose difficult gorge was never a practicable route till the railway from Sofia was carried through it and continued across the limestone foreland north of the Balkans to Varna on the Black Sea. From the Sofia or upper Isker basin comparatively easy passes lead north to the Nishava, a tributary of the Morava, and south to the Maritsa. The Orient express route from Belgrad goes by the Morava and Nishava valleys into the Sofia basin, tunnels through to the Maritsa, avoiding the longer route by Trajan's Gate, follows the main Maritsa valley past Philippopolis to Adrianople, and is continued east by the valley of a tributary rising near the Black Sea to Constantinople, the key both of the Black Sea and of the land route to Asia.

The rest of the interior consists of rugged highlands, enclosing isolated plains. The treeless Thracian or Rhodope Highlands, or Despoto Dagh, are a rugged mountain wedge between the Maritsa and the Struma, forming part of the boundary between the Turkish provinces of Thrace and Macedonia, and between Thrace and Bulgaria. From the Despoto Dagh a series of parallel valleys open south, of which the most important are the Struma, along which a railway is being carried, and the Mesta, or Kara-su, followed for a short distance by the line

which skirts the Aegean, behind the unhealthy coastal fringe of lakes and marshes.

Between the Despoto Dagh and the Albanian Highlands lie the lower, opener highlands of Old Servia and Macedonia, enclosing many small plains. The lower courses of the Macedonian

FIG. 6. Physical Features, Routes, and Towns of Balkan Peninsula.

rivers, including the Vardar, are marshy and malarial, but the region is fertile, and might be made extremely rich. Usküb, in the upper Vardar valley, on a Roman site, commands (1) the route north between the Kara and Shar Dagh to the Morava, (2) west across the intricate Albanian Mountains to the Adriatic, (3) south to Monastir, and (4) by the main line

south by the Vardar to Salonica. Monastir, at the northern end of a depression between the Macedonian and Albanian mountains, commands both the route anciently followed by the Via Egnatia, a Roman military road leading to Durazzo on the Adriatic, and the main line to Salonica round Lake Ostrovo.

South of Salonica the peninsula narrows, and only the western mountains, a continuation of the Dinaric-Albanian system, are well defined. Most of the centre and east consists of detached highland masses, of which Olympus is the highest.

The topography of Greece is determined by the narrowing of the peninsula, the divergence and partial submergence of the ranges, and the drowning of many valleys, forming gulfs between rocky peninsulas or straits between mountainous islands. The plains, though numerous, are not large. Thessaly, with the small town of Larissa and the port of Volo, is typical. It is separated by Othrys, Oeta, and Parnassus from the plains of Attica and Boeotia, the former with Athens as the capital and Piraeus as the port. These lowlands are continuous with those of Euboea, on the opposite side of the narrow Strait of Chalkis. Small plains are found at the head of the many peninsulas of the Morea, where the ranges diverge like the fingers of a hand. There is one important break from east to west, the Gulf of Corinth, with Patras at its western end. Eastwards this depression is continued by a narrow isthmus. across which a ship canal has been cut.

The west coast is fringed by the mountainous Ionian Islands (Corfu, Cephalonia, Zante), with dry but fertile intermont plains resembling those of the mainland. The Cyclades and Sporades fringe the eastern coast of the southern or Aegean portion of the peninsula. Wider straits separate the mainland from Cerigo and Crete, both continuing the mountainous structure of the mainland.

The western mountains—Dinaric, Albanian, and Greek—consist of parallel limestone ranges, separated by deep steep-sided depressions. As far south as the Drin, where they turn

east, the general direction is north-west and south-east. The mountains descend steeply to the sea, and a chain of islands parallel to the coast represents a submerged outer range. South of the Drin, whose gorge forms a difficult route from Lake Ohrida to the Adriatic, the mountains recede from the coast, which is fringed with malarial lagoons till interrupted by the cliffs of the Acroceraunian Highlands. In Greece the parallel ranges of Pindus run north and south, forming a difficult region where the Zygos Pass is the only practicable route to the Thessalian plains beyond. The Ionian Islands represent a submerged outer range, the drowned valleys forming shallow seas, with occasional shallow gulfs, the largest of which is the Gulf of Arta.

The whole region is a typical limestone or karst country. The rock is porous and easily dissolved by water. The rivers cut deep, steep gorges, and often disappear entirely through the porous limestone, flowing for some distance underground, and gushing out at lower levels. Often swollen by the heavy rains of the Adriatic slope, too swift and deep to ford, and too deeply sunk in their gorges for irrigation, they render the country still more difficult to cross. The peaks and pinnacles weather into fantastic forms, and the scenery is desolate in character, as the surface soil retains little water and vegetation is scanty. Besides caverns and sink holes there are many plains, or *polyes*, eroded below the general level. In the rainy season the surface water rises above their floors, converting them into temporary lakes, and leaving behind for cultivation a rich deposit of fertile soil.

Climate and Products. The northern slopes and valleys of the Balkans have the climate of Central Europe. The mountains are forested with oak and beech. The valleys opening north are planted with orchards, chiefly of plums. The fruit is roughly dried into prunes, preserved for dessert use, or used for distilling a plum brandy. The valleys opening south, with the climate of the most favoured parts of Asia Minor, are planted with vineyards, mulberry and olive

groves, and innumerable rose gardens. Cereals are grown on the northern and southern slopes of the Balkans, in Bulgaria and Eastern Rumelia. In Greece an important export trade in currants has led to the cutting down of many fine old olive groves, which were of more permanent value to the country. The peninsula produces more luxuries than necessaries. This is partly explained by the fact that olive oil, the staple food in the south, is extraordinarily sustaining, making an otherwise frugal diet ample.

The Adriatic coast has a heavy rainfall, especially in winter. The valleys bear Mediterranean fruits, and the lower mountain slopes are clothed with evergreen forests. Much of the surface is better suited for pasturage than agriculture, which is little developed in the rugged highlands of the west.

Political Divisions. The want of geographical unity is reflected in the lack of political unity. There is no centre from which the whole peninsula can easily be dominated. Sofia and Adrianople, though they control many routes, permanently influence only the small surrounding regions. The isolated plains, basins and valleys foster strong but intensely local patriotism, and keep alive jealousies which are made more acute by differences of race and religion. No area in Europe of the same size is under such divided political control. Greece, in the extreme south, is an independent kingdom; Turkey holds Macedonia, Thrace and Albania; Bulgaria occupies both slopes of the Balkans; Servia controls the Morava basin and the highlands which enclose it; while the kingdom of Montenegro and Bosnia-Herzegovina, the latter annexed to Austria-Hungary, occupy the north-western mountains.

Bosnia-Herzegovina (23,000 square miles) consists of parallel limestone ranges, with elevated valleys and plateaus between. There is some flat land suited for agriculture along the Save and the lower courses of its tributaries, but for the most part the rivers flow in deep gorges between mountain walls. Cereals, potatoes, flax, and hemp are grown, and plum

orchards are numerous. Half the surface is forest, which is of little value, owing to the absence of roads. Cattle, sheep, and goats are kept, and sheep and goat skins are exported. Such manufactures as leather and paper from wood-pulp are developing under Austrian encouragement, and roads and railways are slowly opening up the country. The capital of Bosnia is Sarayevo, from which a line runs across the Dinaric Alps through the famous gorge of the Narenta to Mostar, the capital of Herzegovina.

Montenegro (3,600 square miles) also belongs to the karst region, except along the narrow coastal strip, where olives and other Mediterranean fruits are grown in the lower valleys, and the east, which is better watered and wooded, enabling cereals, potatoes, and fruits to be grown. The mountainous character of the country, which reaches 8,000 feet, and the porous nature of the soil, which retains little surface water, are unsuited to agriculture, and the keeping of animals is the chief occupation. Fish from Lake Skutari are among the few exports. The capital is Cettinye, reached from the exquisitely beautiful harbour of Cattaro, which is held by Austria.

Servia (19,000 square miles) has no access to the sea but a long shore line on the Save and Danube. The lowlands lie along the rivers and in the valley of the Morava, the main artery of the country. The rest of Servia is occupied by outliers of the Dinaric, Balkan and Rhodope Mountains, which are densely forested in the west and south-west, where innumerable swine are fed. Agriculture is carried on by peasant proprietors, whose holdings are small and methods primitive. Cereals, plums, vines, tobacco, mulberries for silkworms, and cotton are among the crops raised. Minerals are abundant. The capital is Belgrad, on high ground south of the marshy confluence of the Danube and Save. Nish, the second town, is the junction where the Salonica line, which follows the Morava, leaves the main line for Constantinople, which goes by the Nishava valley.

Bulgaria and Eastern Rumelia. The kingdom of

Bulgaria (37,000 square miles) has a coastline on the Black Sea with the ports of Varna and Burgas, and a long river shore line on the Danube, with Ruschuk and other ports. The principality is almost bisected by the Balkans, the ancient Haemus, which run from east to west, reaching 8,000 feet in the centre, but sinking towards the Black Sea. The range, which is densely forested on the higher slopes and cultivated on the lower, sinks steeply on the south to the Rumelian foreland, and gently on the north to a limestone foreland which ends as the high right bank of the Danube. The climate of Bulgaria, the region north of the Balkans, is extreme. Wheat and maize come to perfection in the hot dry summers. The Rumelian valleys, opening to the south, have very hot summers, but are more sheltered from the cold winter winds of eastern Europe. Roses, from which is made attar of roses, wine, tobacco, and silk cocoons, are the chief products. The upper valley of the Maritsa forms a route from east to west, and the same direction is followed by its tributary the Tunja, which is separated from the main stream by the mountains known as the Anti-Balkans. Sofia, the capital, in the upper Isker basin, commands all the important routes of the peninsula. The surrounding country, where many valleys diverge from the Bulgarian knot, is the most difficult in the peninsula, and the command of routes is essential to political power. Hence Servia, with routes converging on the same critical area, is a natural rival. In Eastern Rumelia the chief town is Philippopolis, dominating the upper Maritsa valley, but its importance is counterbalanced by Adrianople, which is held by Turkey.

European Turkey. The Turkish provinces (62,000 square miles) with the exception of Albania, have little geographical unity. Their present frontiers result from a tide of expansion down the mountain slopes from the north and west meeting a tide of expansion up the mountain slopes from the seas to the south. Thrace is secured to Turkey by the possession of Adrianople, and Macedonia by that of Monastir and Usküb.

Albania is a land of steep parallel limestone mountains, falling sharply to a marshy, harbourless, unhealthy coastal plain. The whole inland region is of the karst type. Of the many lakes the largest are Ohrida and Presba. The chief occupation is the keeping of animals. Agriculture is confined to the valleys opening to the Adriatic, where the lower slopes are terraced for oliveyards.

Old Servia, or **Kossovo,** consists of valleys and basins enclosed by mountains which reach 10,000 feet in the Shar Dagh. The soil is fertile but agriculture is backward. Usküb, on the upper Vardar, is the most important town. Austria holds Novibazar, between Servia and Montenegro.

Macedonia is the name given to the highlands between the Albanian and Rhodope Mountains, the plains which they enclose, and the valleys opening from them to the Aegean. The lower courses of these rivers are marshy and unhealthy, but elsewhere Macedonia is extremely fertile, and would be prosperous but for misgovernment and racial hatreds. Both agriculture and the keeping of animals are backward. Minerals are abundant but little worked. Monastir on the Albanian margin, and the great Jewish city of Salonica on the coast are the chief towns.

Thrace or **Turkish Rumelia,** includes the lower Maritsa and its tributaries, a fertile region with access to three seas. Agriculture is backward, but some cereals are exported from Dede Agach, the port of the Maritsa. Adrianople at the confluence of the Tunja and Maritsa, on which all the roads from the Balkans converge, defends the route to Constantinople, the capital, on the fine harbour of the Golden Horn.

The site of Constantinople is as picturesque as it is strategically important. Including Skutari, on the opposite side of the narrow winding Bosporus, a river-like strait with palaces, gardens, and villages along its hilly shores, the population is about a million. It is the great stronghold of the Mohammedan power in Europe. Its importance as a route centre has already been described.

Greece (25,000 square miles) is a land of mountains, peninsulas, straits and islands. The various fertile plains, the richest of which is Thessaly, are isolated from each other; the soil is thin, stony, and very porous; the rivers are deeply cut and unsuited for irrigation; and the rainfall is scanty, especially in the east. Only about one-fifth of the surface can be cultivated. The draining of the marshy lake Copais, in 1893, added to Boeotia some 100 square miles of soil well suited for growing cotton. The currant crop is the most important. Sheep and goats are kept on the mountain pastures. Athens, built in a sterile plain, round the base of a high crag which defended the narrow route between the mountains and the sea, has many remnants of its ancient magnificence. Its port is Piraeus, with a fine harbour. Euboea, or Negroponte, off the coast of Attica, is fertile and prosperous, combining with the quarrying of marble the growing of vines and cereals. Most of the islands of the Aegean have fertile agricultural plains, and the hill slopes are terraced for olives. Syra, or Hermupolis, is the commercial centre of the archipelago.

The Ionian Islands are larger and more fertile, and have a better climate. Zante has the richest land, but in all the currant is the chief crop. Corfu is becoming a popular winter resort.

Crete (3,000 square miles) is a long mountainous island, with small fertile plains and terraced hills producing olives, carobs, valonia, and other Mediterranean products. There are no good harbours, but Suda Bay, near Canea, the chief town, is a fair roadstead.

Historical Summary. Lying on the route between Asia and Europe the Balkan peninsula has always been the pathway of invading races, while its isolated plains and remote glens have never promoted race fusion. Hence it has always been the scene of racial strife and of conflicting interests. The lack of unity was conspicuous in ancient Greece, where each glen or plain supported a small independent city state. The

first definite movement towards unity came from Macedonia, where relative ease of communication was reflected in larger political ideas. The Macedonian empire fell to pieces on the death of Alexander in 322 B.C. Under Roman rule the peninsula prospered, and for centuries Constantinople divided with Rome the empire of the World. As the Roman power declined invading Serbs and Bulgars pressed in by the northern routes, the latter forcing the Serbs into the western mountains. A new enemy arose in the south, and in A.D. 1453 Constantinople fell to the Turks, and the tide of invasion swept inland. It began to ebb in the seventeenth and eighteenth centuries, and the nineteenth witnessed the gradual break up of the Turkish empire. The present political conditions date from the treaty of Berlin in 1878. There are minor details of interest, as, for instance, the former extension of Venetian power along the Dalmatian coast, and to points in the Levant. The superior prosperity of the Ionian Islands at the present day is partly due to this remote cause.

ITALY.

Physical Structure. Italy, like the Balkan peninsula, consists of lowlands separated by mountains. In Italy, however, the lowlands are often large, they open to the sea, the mountain barriers are lower and less complex in structure, and the natural obstacles to intercommunication are more easily overcome.

The mountains of Italy, including Sicily, form a continuous chain, 800 miles long, known as the Apennines. They diverge from the Alps in the extreme north-west, the Col dell' Altare (1,600 feet) near Savona being generally taken as the link between the two. The Apennines, which fall steeply to the Western Mediterranean, are at first almost parallel to the Alps, but are divided from them by the lowlands of the Po, to which the northern and eastern valleys of the northern Apennines open. The system gradually broadens into parallel ranges,

and trends diagonally towards the Adriatic coast, leaving the lowlands of Tuscany and Latium between the mountains and the western sea. To this flow the principal rivers of Central Italy, the Arno from the Tuscan Apennines, and the Tiber from the Umbrian, the upper and middle courses of both being cut across a rugged foreland. Short rapid rivers drain the valleys opening to the Adriatic. The Apennines culminate in the wild region of the Abruzzi, where the peaks of the Gran Sasso exceed 9,500 feet.

To the west of the Central Apennines is a foreland, mainly volcanic. Bolsena, Bracciano, Albano, and other lakes fill the craters of ancient volcanoes in Tuscany and Latium while the active volcano of Vesuvius rises in Campania.

The Southern Apennines trend towards the Western Mediterranean coast, which is reached in the 'toe' of Italy—Calabria. They fall steeply to the Mediterranean, receding from the Adriatic, which is bordered by the Apulian lowland. Small plains enclosed between mountain spurs dot the shores of the Gulf of Taranto and both shores of the Calabrian peninsula.

The mountains of Sicily are a continuation of the Apennines. They fall steeply to the sea in the north, while a limestone foreland runs to the south and east coasts. The culminating peak of Sicily is the active volcano of Etna (10,700 feet). A line of submarine elevation connects the mountains of Sicily with those of Northern Africa.

The slopes of the Apennines, even where they rise steeply from the sea, have been extensively terraced for cultivation, and the olive and vine are grown up to about 3,000 feet. Forests are rare, and above the line of cultivation the rocky summits are bare, or covered with poor pasture. The lowlands are the most fertile and densely populated part of the country, especially in the north. There are four lowland areas in Italy: (*a*) the North Italian alluvial plains; (*b*) the western foreland of smaller plains and volcanic heights, belonging to the Western Mediterranean; (*c*) and (*d*) the limestone

forelands of Apulia and Sicily, both belonging to the Eastern Mediterranean basin.

Piedmont, Lombardy, and Venetia. The plain of the Po is part of a depression between the Alps and the Apennines, the lower end of which is represented by the Adriatic Sea, between the Apennines and the Dinaric Alps. The upper part has been gradually filled by the deposits brought down by the rivers which drain the southern slopes of the Alps in long parallel valleys. As these carry more water and rock waste than the rivers from the Northern Apennines, and have a greater impetus owing to the steepness of their upper valleys, the course of the Po is slowly but steadily pushed towards the south. The filling up of the Adriatic is proceeding rapidly, by the extension of the deltas of the Po and of the numerous rivers which flow into the Gulf of Venice. Of these the Adige, Brenta, and Tagliamento are the chief. This results in the silting up of Adriatic harbours, many of which have become inland towns since classical times.

The climate of this great lowland is somewhat extreme, and the rainfall is scanty. In the south it is a meadow land, famous for cheese (Gorgonzola, Parmesan). The next zone is agricultural, and is irrigated from the Alpine streams, the whole plain being covered with a network of narrow canals. Olives cannot be grown owing to the cold winters, but the summer is hot enough to ripen rice. The vines are trained up mulberries, whose leaves feed silkworms. Milan is the centre of the important silk industry, and the most progressive city in Italy. Tourists visit it for its fine cathedral and its galleries. In the southern Alpine valleys, which are sheltered from cold winds, both olives and vines are grown, and silkworms are bred.

The position of the towns should be carefully noted. The region round the Po is marshy, and consequently the Aemilian way, the great Roman military road, along which are Bologna, Reggio, Modena, Parma, and Piacenza, skirts the base of the Apennines. Some towns, like Cremona, are built where the

river could be bridged. In the west the Montferat hills, with terraced vineyards, rise south of the Po. The river Tanaro, flowing between them and the Apennines, forms an important route, commanded by Alessandria. In this pass many battles have been fought.

North of the Po the towns lie at the mouths of valleys, affording routes across the Alps. Turin, in Piedmont, commands a group of passes leading (1) to the Durance and the lower Rhone valley, (2) to the Isère, the Saône, and Central France, and (3) to the Dora Baltea and Lake Geneva. Milan commands routes to the upper Rhine and Rhone valleys. The most direct is by the St. Gotthard to the Rhine (see p. 59). Verona commands the low Brenner route to the Danube, open all the year (see p. 63). Venice commands routes to the Drave and the Danube (see p. 65).

The volcanic Berician and Euganean Hills confine the routes between Lombardy and Venetia to narrow passes, commanded by Vicenza and Padua.

The morainic hills, south of Lake Garda, narrow the space between the mountains and the Po marshes. As the route to the north by the Adige diverges here, their possession is of great importance in war, and many battles have been fought between the fortress of Mantua, on the Po, and the lake of Garda.

Venice, with the fine cathedral of St. Mark's, is built on many small islands, separated by canals and connected by bridges. Sandbanks and lagoons in front, and marshy lagoons in the rear, make it difficult to attack by sea or land. Founded in the troublous fifth century A. D., it succeeded to the old Roman port of Aquileia. It became an important sea power in the middle ages from its position where the land routes across the Alps converge on the Eastern Mediterranean.

The plain of the Po does not belong to Italy physically, and has frequently had a separate history. The Gauls, entering by the Alpine routes, held it till its conquest by Rome in the third century B. C. The Romans built military

roads, and planted colonies at such strategic points as Bologna, where the route across the Apennines from Tuscany enters the plain, or Piacenza, where the Apennines reach the Po. As Roman power declined, invaders again poured through the Alpine passes. The Lombards held Lombardy, and also conquered Spoleto (see p. 44) and Benevento (see p. 45), which control the Southern Apennines. Charlemagne included Lombardy in the Holy Roman Empire, but it gradually broke up into independent cities and duchies, of which Milan was the most important. In the fifteenth century France and the Emperor struggled for the possession of Northern Italy, which fell to Austria in the eighteenth century. In the middle of last century it threw off the Austrian yoke, and became part of modern Italy.

Tuscany, the ancient Etruria, consists chiefly of the basin of the Arno. It is broken up by the hills which form the Tuscan foreland of the Apennines into small fertile plains, in which the olive and vine are the chief products. This configuration favoured the growth of independent cities, represented in Etruscan times by the league of Twelve Cities, and in the middle ages by the growth of such rivals as Florence and Siena. Florence (*Ital.* Firenze) is built where the Arno leaves the mountains, and commands a route across the Apennines to Bologna by the Reno. Its beautiful situation, fine cathedral, and art treasures, make it one of the show cities of Europe. The chief towns of the lower Arno are Lucca, noted for olive oil, and Pisa, once a great maritime republic. The mouth of the Arno is now silted up, and the port of Tuscany is Leghorn (*Ital.* Livorno).

Liguria. From Pisa, the coast route, followed by a railway, is cut at the base of the steep Apennines, which come close to the sea. Spezia, on a magnificent bay, is the Italian arsenal. Genoa, on the fine gulf, is a busy port, commanding routes over the low Apennines into Piedmont and Lombardy. Savona, farther west, commands the Col dell' Altare route. Liguria, sheltered by the Apennines, has a genial climate, and

the coast, or Riviera, is dotted with winter resorts, set in orange and lemon groves, among exquisite sea and mountain scenery.

FIG. 7. Routes and Towns of the Italian Peninsula. The mountainous land is shaded.

Umbria is a hilly region, lying behind Tuscany and Latium, on the western slopes of the Central Apennines. It is drained by the Upper Tiber. The towns are generally built

on isolated hills, the lower slopes of which are terraced for vines and olives. Many have been famous in the history of art. Perugia, east of the marshy lake Trasimene, commands the route to Rome by the Tiber valley. Spoleto, commanding the same route, was an important post on the Flaminian Way, the military road from Rome to Ariminum (Rimini), on the Adriatic. A line runs to the Adriatic at Ancona, from whence it is continued south along the narrow plain between the Adriatic and the Apennines, beneath the crags of the Gran Sasso, into Apulia.

Latium, the basin of the lower Tiber, extends from the highlands of Umbria to the sea, along which it stretches as a marshy and malarial plain. Volcanic hill masses separate it from Tuscany to the north and from the Neapolitan Campagna to the south. It is connected with Tuscany by the coast route from Pisa, on the lower Arno, across the desolate Maremma. Another route leaves the Arno at Florence, and reaches the Tiber valley near Orvieto, an interesting city on an impregnable crag.

Rome. Rome was built on a cluster of low hills on the left bank of the Tiber, a few miles from the sea. The site was easy of defence, high enough above the swampy Tiber plain to be healthy, connected with the sea by a navigable river, and far enough inland to be safe from pirates. An island makes the river easy to bridge, and the bridge secured the control of the routes to the north. The surrounding plain or Campagna, which stretches north to the Sabine and south to the Alban hills, though now malarial and uninhabited, was then drained, cultivated, and populous. The hilly nature of the site is disguised to-day by the filling of the intervening valleys with the accumulations of centuries. Most of the city is modern, but the Forum and Colosseum from classical days, and the immense renaissance cathedral of St. Peter's, are imposing monuments of the past.

Founded in the eighth century B. C., Rome early conquered the neighbouring cities, and expanded over Italy by the routes

thus opened. After the downfall of Carthage it succeeded to the control of the Western Mediterranean, and later to that of the whole sea and the surrounding lands. The Alpine routes led to the North Sea and the distant shores of Britain, while eastwards the Roman power reached the Euphrates. As the Empire lost its geographical unity it became more vulnerable, and under successive barbarian attacks crumbled into fragments out of which modern Europe has been formed. As the seat of the Papacy it retained the spiritual supremacy of the World, and is to-day the capital of Christendom as well as of modern Italy.

Campania has a fertile soil and a genial climate, and has long been densely populated. Naples, on a magnificent bay, dominated by the smoking cone of Vesuvius, is the most populous town in Italy. From the Bay of Naples a lowland opens inland eastwards to the base of the Apennines. To the north the coast is malarial, and the route to Rome turns inland to avoid the Pontine marshes, utilizing the long valleys which run parallel to the coast. The Volturno is crossed at Capua, a city famous in Roman times for the wealth and luxury of its inhabitants. South of Naples the coast resembles that of Liguria. Mountains descend steeply to the sea, their lower slopes planted with olive-yards and lemon groves.

Southern Italy. A railway follows the coast south from Naples to Reggio in Calabria, along a picturesque route cut along the base of the mountains. There are occasional villages, but no towns, and the inhabitants are fishermen or shepherds. The routes east across the Southern Apennines are difficult owing to the narrowness of the defiles. Benevento, a junction for many railway lines, is the key of all the routes leading from Campania into Apulia. On the eastern slopes of the Apennines are the limestone plains and plateaus of Apulia, in the north of which Monte Gargano projects into the Adriatic. Passes lead north to the desolate, thinly peopled district of the Abruzzi. The soil of Apulia is fertile, and produces a hard wheat, which is made into macaroni. Bari is the most

important town. Brindisi, the ancient Brindusium, is the nearest Italian port to the Suez Canal, and the terminus of the overland mail route to the east. Taranto, with a fine harbour, on the site of the Greek city of Tarentum, is rising in importance.

Sicily, dominated by Etna, in circumference nearly 100 miles round, is mountainous, with fertile plains in the south. The rainfall is scanty, the summers hot, and the winters mild. Several crops can be reaped in a year on irrigated land. The olive can be grown up to 3,000 feet, and the forests, evergreen and deciduous, extend up to 6,000 feet. Most of the modern towns are near the site of ancient cities. Messina, on the strait, exports wine. Catania, at the base of Etna, exports sulphur. The harbour of Palermo, the capital, on the north coast, the ancient Panormus, has been reduced in size by the rising of the coast.

The lowlands of Sicily, opening south and east to the eastern Mediterranean, were early colonized by Greeks and Carthaginians. The island became Roman in 210 B.C., and its fertility made it one of the granaries of the Empire. After the break-up of the Empire it fell to many successive masters. In 1738 it was united with Naples as the kingdom of the Two Sicilies, and was finally incorporated in modern Italy.

Sardinia is a highland, rising to over 6,000 feet. The lowlands, which are malarial, are in the north-east and south-west. The forests, mines, and fisheries are all neglected. Wheat, pulses, potatoes, and fruits are grown, and horses, sheep, and goats are bred. The capital is Cagliari, at the south end of the Campidano plain.

Sardinia was first Carthaginian, and then Roman. Under Roman rule roads were made, and the cultivation of wheat was encouraged. Lying in the centre of the western basin, it was later attacked by every power which controlled the neighbouring seas, and was successively held by the Vandals, Goths, Saracens, the Byzantine Emperors, the Popes, Pisa, Genoa, Aragon, and Austria. In 1720 the house of Savoy took it in exchange for Sicily. The kingdom of Sardinia, which included Savoy and Piedmont, gave the first king to modern Italy.

Corsica stretches north of Sardinia to within 50 miles of the Tuscan coast. It is mountainous, rising to nearly 9,000 feet through different vegetation zones. The small eastern lowlands are fertile but malarial. Fishing and cattle rearing are the chief occupations, and the mineral wealth is neglected. It has had many masters since Roman times, and is now a French department. Ajaccio, the capital, is the western, and Bastia, the eastern port.

Historical Summary. Italy is the natural link between the two Mediterranean basins, commanding all the routes between them. It also has access by the Adriatic and Po depression to the great routes across the Alps. Thus it has advantages of position not possessed by the other two Mediterranean peninsulas, whose influence is confined to a single basin. This superiority is reflected in the supremacy of Rome, temporal and spiritual. It also explains the continual wars for the possession of Italy in the middle ages.

SPAIN AND PORTUGAL.

Physical Structure. The Iberian peninsula, politically divided into Spain and Portugal, has an average elevation of 2,000 feet. Its core is a high plateau, called the *meseta*, which falls steeply to wedge-shaped lowlands in the north-east and south-west. Beyond these lowlands rise higher, more recent mountains, the Pyrenees in the north and the Sierra Nevada in the south. These belong to the great mountain system which borders the Northern Mediterranean and is continued through Asia Minor and Armenia into Asia.

The Pyrenees, the only land frontier of the peninsula, stretch from the Atlantic to the Mediterranean. They consist of ranges which run east and west and diverge in the east. They rise above the snow-line, which is about 9,000 feet on the northern and 10,000 feet on the southern slopes. The lower slopes are richly forested. The present glaciers are small, but the central part of the range shows many signs of

former glaciation. Among them are the numerous *corries* or niches on the mountain sides, and *cirques*, or amphitheatre-like endings of U-shaped valleys, formerly filled by glaciers (see p. 69). Gavarnie, on the French side, is the finest of these cirques. The ridge level is very uniform, the *cols*, or saddles, being generally only about 1,000 feet lower than the peaks, the highest of which are Maladetta and Mont Perdu (11,000 feet), both in Spain. This makes communication across the Pyrenees difficult.

In the west the line from Bayonne skirts the coast, tunnels under a col between the Pyrenees and their westward prolongation, the Cantabrian Mountains, and reaches the Meseta by way of the upper Ebro. At the eastern end of the range the line from Perpignan crosses the plain of Roussillon and tunnels below the eastern spurs. Between these the easiest routes are by the pass of Roncesvalles (4,000 feet), famous in Charlemagne's wars; the Col de la Perche (5,000 feet), leading to Toulouse and Carcassonne; and the Perthus Pass (950 feet), leading from Gerona to Perpignan, the route taken by Hannibal in his march on Italy. Though there are less than a dozen practicable passes in a range 350 miles long, the same power has frequently dominated both slopes. The Goths and Saracens overran Languedoc; Charlemagne from the French side held the Spanish March; Aragon long controlled the plain of Roussillon. The Pyrenees did not form the frontier till 1659.

The Meseta is a high, arid plateau, highest in the south and east. Its northern margin forms the Cantabrian Mountains, which fall nearly 9,000 feet to the sea on the north, but on the south overlook the high plains of Old Castile, above which they rise only 2,000 to 3,000 feet. The north-eastern margin, known as the Iberian Mountains, forms the southern wall of the plain of Aragon, which is crossed by the Ebro and shut in on the north by the Pyrenees. The upper basin of the Ebro is cut off from the sea by the Catalonian Mountains, across which the river cuts a deep gorge.

Farther south the high eastern edge of the Meseta recedes from the sea, leaving the narrow coastal plains of Valencia and Murcia. Seen from below, this margin forms a mountain range, drained by parallel rivers, whose upper courses are in deep ravines, but whose lower courses can be used for irrigation. The southern margin rises steeply as the Sierra Morena

FIG. 8. The Routes and Towns of the Iberian Peninsula. The lowlands are left white. The highland areas (the Meseta and the Central Plateau of France) are shown by vertical lines, and the mountain ranges of the Atlas, Betic Cordillera and Pyrenees by horizontal lines.

above the Andalusian lowland, which is drained by the Guadalquivir, the one Spanish river which affords a good natural waterway into the interior. The western margin is less steep and in the south-west descends gently to the lowlands of Estremadura or Lusitania.

The surface of the Meseta consists of lofty plains separated by *sierras*, saw-toothed ridges of uniform height, running from east to west. These, though occasionally rising over 8,000 feet above the sea, are only a few thousand feet higher than the surface of the Meseta. The rivers flow west to the Atlantic in deep gorges which are useless either for routes or for irrigation. In the north the Douro crosses the dry plains of Old Castile and Leon, separated by the Sierra de Guadarrama and the Sierra de Gredos (8,000 feet) from the high plains of New Castile, which are drained by the Tagus. Similar but lower sierras separate the Tagus from the Guadiana, which is turned south by the eastern buttresses of the Algarve mountains to the Gulf of Cadiz. Its basin is separated by the Sierra Morena from the fertile lowlands of Andalusia, south of which the snow-capped Sierra Nevada or Betic Mountains rise in Mulhaçen to over 11,000 feet. The Balearic Islands are an eastern prolongation of this system which has been partly submerged.

Climate and Products. The Iberian peninsula is the driest part of the European Mediterranean. High mountains prevent rainy winds from reaching the interior, and hot, dry winds from Africa increase the dryness of Andalusia and southern Portugal. Northern Portugal and Spain, with warm summers, mild winters, and rain at all seasons, are climatically outside the Mediterranean area. Asturias, on the northern slopes of the Cantabrian Mountains, produces the trees and fruits of Central Europe, and grazes many cattle in the rich mountain meadows.

On the Meseta the rainfall is everywhere scanty, though it differs in quantity and season in different parts. Much falls in violent storms, which flood the rivers. The climate is very extreme, and the winters are too cold for the Mediterranean fruits and evergreens. These reappear on the lower terraces, and cork oak forests are one of the chief resources of Portugal. Most of the treeless plains of the Meseta pasture sheep and goats, while in the irrigated parts, especially round Valladolid,

wheat is grown. Swine are kept in the oak forests of Spanish Estremadura. The only really fertile areas are the irrigated lands of Andalusia, Murcia, and Valencia. In the two latter great attention is paid to proper terracing and irrigation. All Mediterranean fruits and cereals are grown, as well as sugar, cotton, and rice. The date ripens near Elche. The vine is largely cultivated, especially round the coast, and wine is an important export.

Minerals are abundant, and have been worked since Phoenician times. The Cantabrian Mountains are rich in iron and coal, and the Sierra Nevada in lead. In the Sierra Morena the Rio Tinto supplies one-fourth of the world's copper, and quicksilver is mined at Almaden.

Routes and Towns. There are no natural routes from the Mediterranean into the interior. The only considerable break in the mountain barrier, the Ebro, is barred by the Catalonian Mountains. All the natural approaches are from the Atlantic. From the Minho, the northern frontier of Portugal, a strip of lowland, broadening to the south, extends along the Atlantic, and contains the lower courses of the Douro, with the port of Oporto, the Tagus, with the magnificent harbour of Lisbon, and other rivers. This is the most productive and populous part of the country.

The natural route into Spain is by Andalusia, and this has often been the path of conquest. The lower Guadalquivir is marshy and unhealthy. The chief town is Seville, at the head of navigation. Granada, at the base of the Sierra Nevada, and Cordova, at the base of the Sierra Morena, have splendid monuments of their Moorish prosperity. The other towns of Andalusia are Xeres, the centre of the sherry district, Huelva, the mining centre of the Rio Tinto, and Cadiz, a fortified port, founded by the Carthaginians.

The other towns of Spain are either (1) on the coast, (2) in the Ebro valley, or (3) on the lofty plains of Old Castile, the old centre of the Christian power in Moorish days. On the Mediterranean coast, Malaga, Almeria, Cartagena, Alicante,

Valencia, Tarragona, and Barcelona are ports chiefly engaged in the fruit and wine trade. Barcelona is the manufacturing centre of Spain. On the Bay of Biscay are Coruña, Gijon, Santander, and Bilbao, the latter exporting iron ore. Ferrol, in the west, and Cartagena, in the south, are Spanish naval stations.

In the thinly populated Ebro valley the chief town is Zaragoza.

FIG. 9. Lower Andalusia and the Strait of Gibraltar. The land over about 600 feet is shaded with parallel lines. The depth of the sea is also indicated by shading.

On the Meseta the chief towns are Burgos, Leon, Valladolid, and Salamanca in Old Castile, and Madrid and Toledo in New Castile. The surroundings of Madrid are very bleak, the climate is extreme, and the site is difficult of access, offering no natural advantages for a capital except its central position.

Historical Summary. The Carthaginians early settled in Spain. The Romans succeeded to their power, but did not subdue the whole country till the beginning of our era. As the Empire declined, Spain was overrun from the north-east by Goths and Vandals, the latter leaving their name in (V)andalusia. In the eighth century Mohammedan invaders entered Andalusia from Marocco, and reduced the whole country, except a few strongholds in the Cantabrian Mountains. They pushed across the Pyrenees into France, but a decisive defeat at Tours in A.D. 732 turned them south again. They were next driven from the Ebro valley, which became the nucleus of the kingdom of Aragon. The possession of a few strongholds in the Cantabrian Mountains enabled the Christians to expel the Moors from the high plains at their base, and in these were formed the kingdoms of Leon and Castile (the land of Castles). In 1002 the Castilian frontier was pushed to the Tagus, and Leon and Aragon both extended their boundaries. After the union of Leon and Castile the expanding power on the Meseta gradually drove the infidels down its slopes and across Andalusia into the Sierra Nevada. The union of Aragon and Castile was followed by the final expulsion of the Moors from Spain. The unification of the country was aided by the rapid extension of Spanish power in the New World, and when this was checked signs of disunion appeared. France took advantage of circumstances to place French sovereigns on the throne, and a similar attempt by Napoleon led to the Peninsular War. Disastrous civil wars between rival claimants crippled the country in the nineteenth century, the close of which saw the expulsion of Spain from its last strongholds in the New World.

THE AFRICAN MEDITERRANEAN STATES.

Mediterranean Africa. Only the western border of the Mediterranean is included in this term. East of the Gulf of Gabes the littoral forms part of the Sahara (see Fig. 10 for configuration).

Climate. The climate is that of the Mediterranean, but the winters are cold in the highlands. Along the Mediterranean the mild winters are making the towns fashionable winter resorts. The rainfall is scanty. The country is agricultural or pastoral, according to elevation and rainfall.

Natural Zones. The Tell. Algeria is typical of Mediterranean Africa. The coast is bordered by low broken ranges, behind which runs the Tell. The Tell extends from 50 to 150 miles inland. It contains many fertile plains and valleys, and the rainfall is sufficient for cultivation, especially when supplemented by irrigation. In Algeria, the most

FIG. 10. The Atlas Region.

important of these plains are (1) the Sig, with Oran as its chief town, opening to (2) the Sheliff valley, which runs parallel to the coast, (3) the Metija, with Algiers, (4) the Sahel valley, with Bougie at its mouth, and (5) the plain of Bône, or Bona, extending inland from that town. All these under irrigation produce enormous crops of cereals, and all Mediterranean fruits, especially the vine. The cork oak is important in those parts of the once vast forests which have escaped destruction.

The Tell extends west into Marocco, separated by a barren strip from the coast. The plains are covered with fertile

loam. The agriculture resembles that of Algiers, but is more backward.

The Tunisian Tell includes the Majerda valley, opening to the plains of Tunis, in which are grown wheat, barley, and the finest olives in the world. This fertile region was the bulwark first of the Carthaginian and later of the Roman power in Africa. South of Cape Bon, the Tell narrows to a mere ribbon along the coast, called the Sahel (see Figs. 9 and 10).

The High Plateaus. The High Plateaus, which lie south of the Tell, are a series of parallel terraces, separated by mountain margins. They extend from Marocco to Tunis,

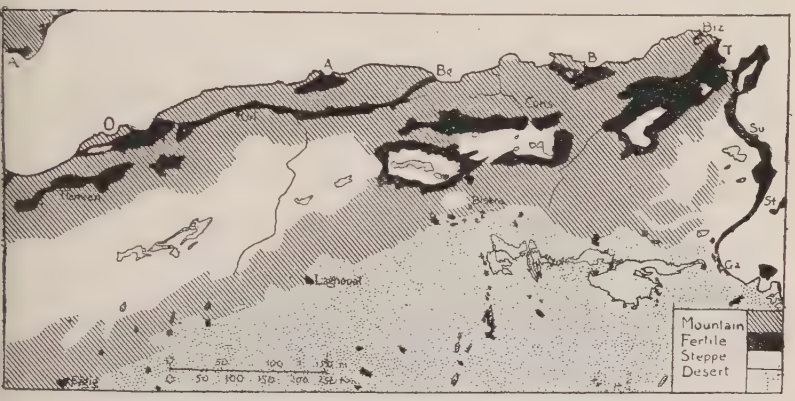


FIG. 11. Algeria and Tunisia, showing surface conditions.

narrowing to the west and east. In Algiers and Tunis they are dotted with salt lakes, or *shotts*, often of considerable size. Much of the surface of this zone is covered with halfa, or esparto grass, used for making paper, and with aromatic herbage, on which camels, horses, sheep, and goats are grazed. The southern margin is formed by the southern or Saharan range of the Atlas, both ranges converging westwards to form the Great Atlas of Marocco, with peaks rising to over 13,000 feet. In the Tunisian Atlas the height does not exceed 7,000 feet. The southern slopes of the Atlas descend to the Sahara.

Marocco (219,000 square miles) is an independent sultanate.

The country is fertile, but badly administered. Roads hardly exist, and law is little respected outside the towns. The Sahara is the home of wandering pastoral tribes. The largest of the oases is Tafilet. The coast is surrounded by a ring of towns, of which Tangiers is the most important. In the interior are Fez, Mequinez, and Marakesh or Marocco city, each in turn the Sultan's capital.

Algeria (185,000 square miles) is French. The French have made good roads, encouraged agriculture and mining, and promoted internal order and external trade. Hundreds of wells have been sunk in the Sahara, forming oases of date palms. Railways have been carried along the plains and valleys of the Tell, linking the important towns with each other. Of inland towns the most important is Constantine, the ancient stronghold of Massanissa, on an eminence surrounded by deep ravines, a situation of great natural strength and beauty. It is connected with Algiers, the capital, by a line which skirts the base of the Great Kabyle, a mountain region inhabited by settled agricultural Berbers. From Constantine a branch runs to Biskra, on the edge of the Sahara, at the foot of the lofty Aures range of the southern Atlas. In the west a railway runs to beyond Figig in the Sahara.

Tunis (45,000 square miles) is a French protectorate. The lines from Algiers reach the capital, Tunis, by the Majerda valley. Sfax, to the south, is the second town. Bizerta, at the mouth of a large lake, is a strong naval station, commanding the passage from the Western to the Eastern Mediterranean by the Strait of Sicily.

THE MOUNTAIN BARRIER NORTH OF THE MEDITERRANEAN.

The Alps. The Alps represent the converging area of the eastern and western members of the mountain system which forms the northern margin of the Mediterranean.

The western part of this barrier, already described, consists of a marginal chain almost encircling the basin, formed by the Apennines, Atlas, Sierra Nevada, and Pyrenees. The eastern portion is double in structure. The northern marginal chain is formed by the Karpathians and Balkans, continued east by the Yaila Mountains of the Southern Crimea, and the Caucasus; the southern by the Dinaric, Albanian and Grecian Alps, and the Taurus. Between the Karpathians and the Dinaric Alps is the depression of Hungary, and between the Balkans and Albanian Alps, the highlands of Servia, Macedonia, and Thrace.

The comparison between east and west may be carried further. Taking the Alps as the centre of the system, there is on either side a mountain-bordered depression, represented in the east by the Hungarian plain, and in the west by the Western Mediterranean. Beyond these again are two mountain-bordered plateaus, the Iberian Meseta in the west, and the highlands of the Balkan peninsula in the east. The resemblance between the Western Mediterranean and the Hungarian Plain is more than superficial, for recent volcanic rocks line the inner margin of both and older masses rise from the floor. Corsica and Sardinia, in the Western Mediterranean, are represented in the eastern depression by the Bihar Mountains of Hungary, and the Balearic Isles by the Bakony Forest, which separates the Upper and Lower Hungarian plains.

The Alps extend from the Gulf of Genoa in a semicircle about 200 miles in diameter, and then run east with diverging ranges to the Hungarian plain. The total length along the central line is over 700 miles. The breadth varies from 30 miles, north of the Gulf of Genoa, to 200 miles, where a cusp-shaped extension separates the Lombard from the Venetian plain. The Alps cover an area (90,000 square miles) equal to that of Great Britain. The passes in common use vary from 4,500 feet (Brenner) to 8,000 feet (Great St. Bernard). Communication north and south across the Alps has been

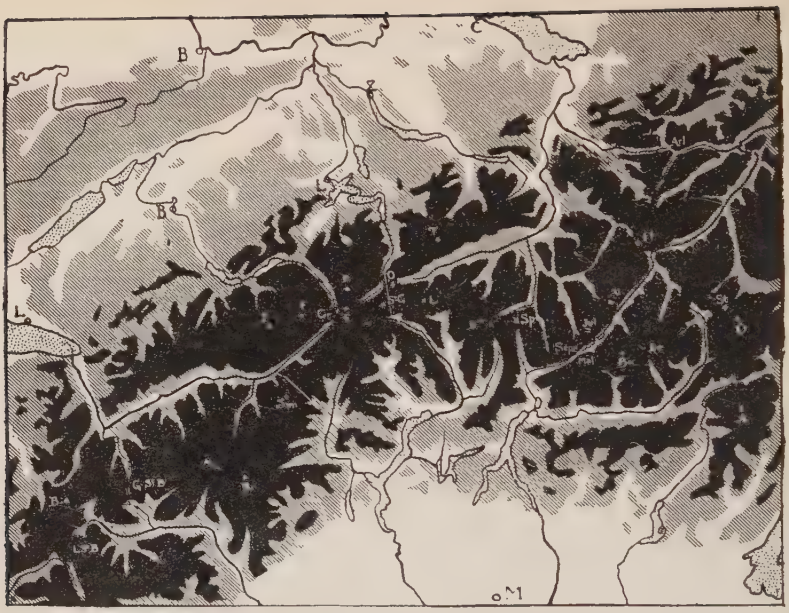


FIG. 12. The Central Alps, the Swiss Plateau, and part of the Swiss Jura. The land under 1,500 feet is white, that over 6,000 feet is black. Compare this with Figs. 13, 14, and 15, and in the west with part of Fig. 17.

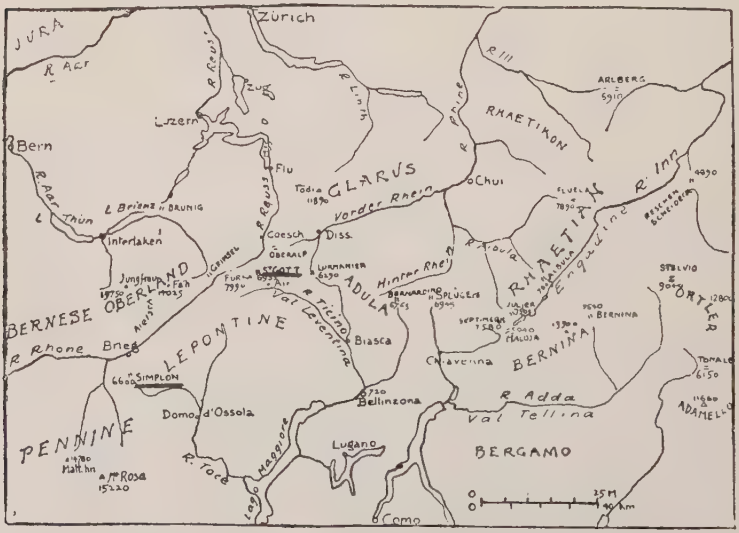


FIG. 13. The Central Alps—Ranges, Rivers, and Passes. Compare this with Fig. 12.

important at least since Roman times. The two great natural routes are by the Rhone valley, from the Gulf of Lions in the west, and by the Laibach plain, or Kroatian Gate, from Venetia to Hungary, in the east.

An understanding of the main features of the Alps is very important, and a number of figures are inserted which should be carefully studied.

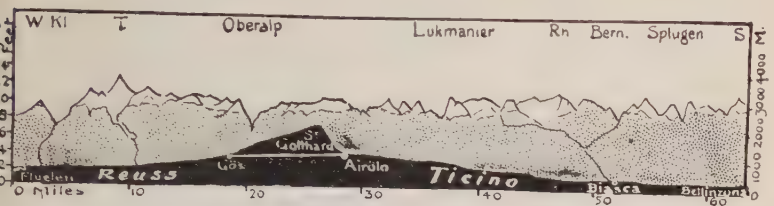


FIG. 14. Section from north to south along the St. Gotthard Route. The white line indicates the St. Gotthard tunnel. Cf. Figs. 12, 13, and 14.

The St. Gotthard Region. Figs. 12 and 13 show four remarkable valleys opening from the St. Gotthard Alps to the four points of the compass. The Rhine and Rhone flow in opposite directions along a longitudinal furrow from west-south-west to east-north-east. Both cut deep gorges north across the mountains, the Rhine to Lake Constance, the Rhone to Lake Geneva, south of which rises Mont Blanc, the highest mountain of Europe (15,730 feet). Between these is the Swiss Plateau,

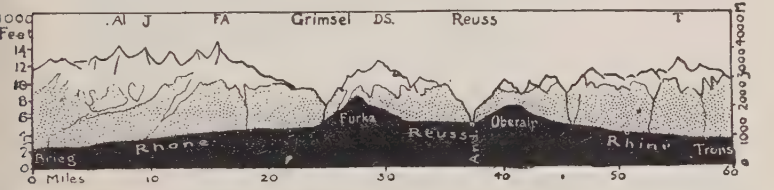


FIG. 15. Section from west to east along the valleys of the Upper Rhone, Upper Reuss, and Upper Rhine. Cf. Figs. 12 and 13.

bordered on the north-west by the Franco-Swiss Jura, across the ends of which both rivers, after leaving the lakes, cut deep valleys. The other two rivers flow north and south. The Reuss, which rises in the same furrow as the Rhine and Rhone,

FIG. 16. The Western Alps, Jura, and Saône-Rhone valley. The land under 1,500 feet is white, that over 6,000 feet is black. Cf. Fig. 17.

flows to the former, while the Ticino flows south to the Po. The diagram shows the divisions of the Alps made by these valleys (see Fig. 13).

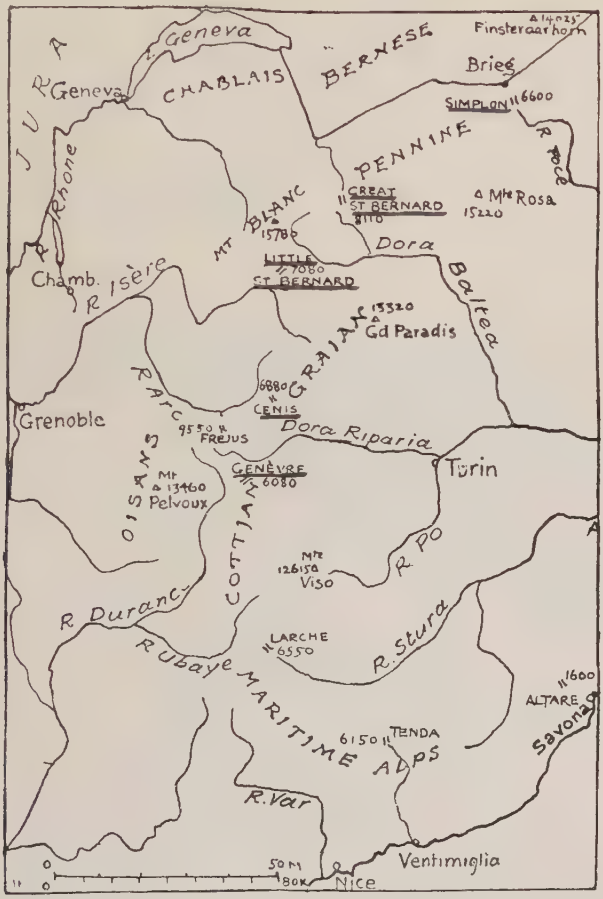


FIG. 17. The Ranges, Passes, and Rivers of the Western Alps. Cf. Fig. 16.

The Western Alps. The Rhone flows along the western margin of the Alps, in a valley which separates them from the Central Plateau of France. Its left-bank tributaries, the Isère,

which receives the Arc, and the Durance, which receives the Ubaye, lead to relatively low passes communicating with the Dora Baltea and Dora Riparia, left-bank tributaries of the Po, and the Stura, a right-bank tributary, all draining the eastern slopes of the Western Alps. These valleys define the principal mountain masses as shown in Fig. 17.

The Eastern Alps. East of the St. Gotthard the structure

FIG. 18. The Eastern Alps. The land under 1,500 feet is white, that over 6,000 feet is black. Cf. Fig. 19.

is more complicated. The ranges become triple or quadruple. The first river to trace is the Inn. In its upper course it flows north-east through the Engadine valley, between the Rhine and Adda (Fig. 13). In its middle course it flows east-north-east, crosses the northern ranges of the Alps in a transverse valley, and flows north-east to the Danube. The Danube receives many other tributaries, Iller, Lech, Isar, &c.,

from the outer slopes of the Alps, all crossing the Swabian-Bavarian Foreland, a continuation of the Swiss Plateau. South of the middle Inn is the Adige valley (*Ger.* Etsch), leading to the low Brenner pass, a very important route. The region outlined by these valleys is shown in Fig. 19.

East of the Brenner, notice the long line of the Tauern range, with the Salzach and Enns valleys at the northern foot, and the Drave at the southern. The two former pass in transverse

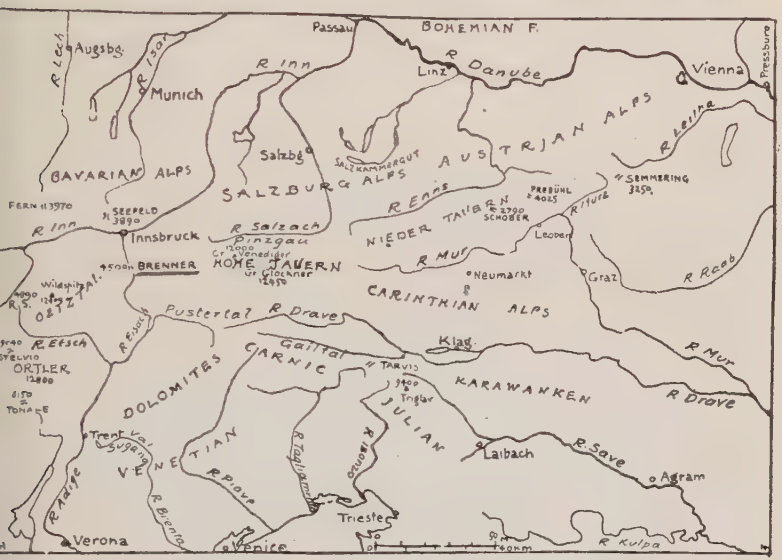


FIG. 19. The Ranges, Passes, and Rivers of the Eastern Alps. Cf. Fig. 18.

gorges across the Salzburg and Austrian Limestone Alps to the Danube. The Drave runs east to the Danube, which it joins in the Hungarian plain. In the east the Mur valley comes between the Drave and the Enns, and the Save between the Drave and the Venetian-Adriatic depression. The series of parallel river valleys, running west and east, and their relation to the mountains, is shown in Fig. 19.

In the east the ranges sink beneath the Hungarian plain. The Little Karpathians and the Bakony Forest link the

northern ranges of the Alps to the Karpathians, while the Dinaric Alps continue the Southern Limestone Alps.

Alpine Passes. The western and central passes are generally higher than the eastern. The most important are followed by railway routes. East of the Brenner, where a series of ranges are separated by valleys running east and west, several passes must be crossed in the routes from north to south.[1]

Alpine Railway Routes. The chief railway routes across the Alps are :

(1) The Mont Cenis, by the Arc, with a tunnel under the Col de Frejus, 7½ miles long, and 4,380 feet high, opening to the Dora Riparia and Turin.

[1] **Alpine Passes and Routes.** The principal passes of the Alps are best remembered in connexion with their Italian terminus. Figs. 13, 17, and 19 should be examined, and also the orographical maps of Figs. 12, 16, and 18.

1. From Turin—
   - (*a*) from the Po to the Mediterranean: Col dell' Altare (1,600) to Savona; Col di Tenda (6,150) to Ventimiglia.
   - (*b*) from the Po to the Durance: Col de Larche or d'Argentière (6,545) by the Stura and Ubaye valleys; Mont Genèvre (6,080) by the Dora Riparia and Durance.
   - (*c*) from the Po to the Isère: Mont Cenis (6,880) by the Dora Riparia and Arc; Little St. Bernard (7,180) by the Dora Baltea and Isère.
   - (*d*) from the Po to the Rhone: Great St. Bernard (8,110) by the Dora Baltea to Martigny.

2. From Milan—
   - (*a*) from the Po to the Rhone: Simplon (6,600) by L. Maggiore and the Toce valley to Brieg.
   - (*b*) from the Po to the Rhine: St. Gotthard (6,935) by the Ticino and Reuss valleys; Lukmanier (6,290) by the Ticino and Vorder Rhine; Bernardino (6,765) by the Ticino and Hinter Rhine; Splügen (6,945) by the Adda valley and L. Como to the Hinter Rhine.
   - (*c*) from the Po to the Danube: Maloja (5,940) / Bernina (7,640) by the Adda and L. Como to the Inn.*

3. From Venice to the Danube—
   - (*a*) Reschenscheidegg (4,890) by the Adige to the Inn and thence by the Arlberg pass from the Inn to the Rhine.
   - (*b*) Brenner (4,500) by Verona and the Adige, Eisach and Inn valleys.
   - (*c*) Tarvis from the Tagliamento to the Drave.

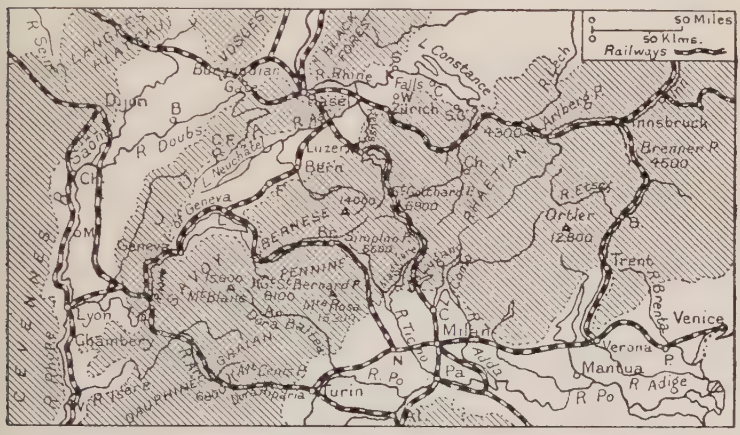
* The Julier pass (7,500) from the upper Inn to the Rhine has been long used in connexion with the Maloja.

(2) The Simplon, from Lake Geneva, by the Rhone valley, with a tunnel under the Simplon, 12¼ miles long and 2,260 feet high, to the Toce valley, Lago Maggiore, and Milan.

(3) The St. Gotthard, from Luzern by the Reuss valley, with a tunnel below the St. Gotthard, 9½ miles long and 3,785 feet high, to the Ticino valley, Lakes Lugano and Como, and Milan.

(4) The Brenner, from Munich to Innsbruck, and thence by the Brenner pass down the Adige to Verona. No tunnel is over half a mile long.

(5) The Semmering. The trend of the valleys of the Eastern


50 Miles
50 Kms.
Railways
VOSGES
BLACK FOREST
L. Constance
R. Rhine
Falls of Rhine
Zürich
R. Aar
R. Doubs
Basel
Dijon
Luzern
Bern
Innsbruck
Brenner P. 4500
R. Inn
R. Etsch
Ortler 12800
Trent
Venice
Verona
Mantua
R. Adige
R. Po
Milan
Lyon
Chambery
Turin
Mont Cenis
Mont Blanc
Mont Cervin
Simplon P. 6500
St. Gotthard P. 6900
Lake Geneva
Lake Como
Lake Lugano
Lake Maggiore
R. Rhone
R. Ticino
R. Adda
R. Brenta
R. Isère
R. Arve
R. Durance
R. Var
R. Reuss
R. Limmat
R. Aare
R. Saône
R. Ill
R. Sesia
R. Toce
R. Dora Baltea
R. Dora Riparia
R. Piave
R. Tagliamento
R. Isonzo
R. Drave
R. Save
R. Laibach
R. Mur
R. Leitha
R. Traun
R. Enns
R. Salzach
R. Ybbs
R. Traisen
R. Leitha
R. Mur
R. Drave
R. Save
R. Laibach
R. Isonzo
R. Tagliamento
R. Piave
R. Brenta
R. Adige
R. Po
R. Ticino
R. Adda
R. Aare
R. Reuss
R. Limmat
R. Saône
R. Ill
R. Sesia
R. Toce
R. Dora Baltea
R. Dora Riparia
R. Isère
R. Arve
R. Durance
R. Var
R. Rhone
R. Inn
R. Etsch
R. Aar
R. Doubs
R. Rhine

then by the Salzach and Enns, over the Schober pass to the Mur, and over the Semmering pass to Vienna.

The influence of these routes has always been very great. The number of routes connecting the Po and the Rhone made the Romanization of Southern France easy. In more recent times both slopes have been alternately French and Italian. Milan, the terminus of routes by the Rhone, Rhine, and Danube, has had many masters. The route to the Danube used during the Austrian occupation was by the Adda valley and the Stelvio pass to the Adige, and thence by the Brenner or the Pusterthal to the Drave. The great trade routes of the Middle Ages went by the Brenner and Seefeld passes to the Isar, Lech, and Iller for Munich, Augsburg and Ulm, or down the Inn for Munich and Regensburg (Ratisbon). The Rhine traffic left the Danube at Ulm, following easy routes to the Neckar and Rhine. The Danube traffic went down stream by Regensburg to Vienna.

Climate of the Alps. The higher the elevation the thinner is the atmospheric envelope (see *Oxford General World Geography*). As less of the Sun's heat is lost in passing through it, the rays have a greater heating power. On the other hand, more heat is lost by radiation during the night, for the atmospheric envelope retards radiation. Mountain valleys have great daily variations of temperature. The climate of the northern and southern slopes differs. The northern slopes receive less sunshine in the northern hemisphere and more in the southern. On the northern slopes of the Alps evergreen forests creep far down the valleys. At the same elevation, on the southern slopes, the trees are deciduous, and cereals can be grown.

Air is heated by contact with the earth. Its temperature diminishes with altitude. This is better seen by ascending a solitary mountain than on a high plateau, because in the latter case a larger surface of air is in contact with the earth. In the northern hemisphere the diminution in temperature is most marked in the early summer months, when the Sun's

heat is absorbed in melting the snow rather than in warming the surface of the Earth. The difference is least marked in December, when the snow-line is lower, cooling the lower levels.

Mountains are generally rainier than lowlands (see *Preliminary Geography*, pp. 57, 58). Up to a certain height rainfall increases uniformly with elevation, but above that it diminishes as the moisture in the air becomes exhausted. In the Alps, the maximum rainfall is at about 6,500 feet. The snow-line depends partly on rainfall, and partly on summer temperature. It is lower on the northern than on the southern slope. In the Tauern it is 8,500 feet on the northern and 9,250 feet on the southern slope. On the wetter ranges to the west it is much lower. It is lowest in the Alps in January, and highest early in August.

The Foehn. The foehn wind affects the climate of many valleys. It blows strongly in the valleys opening north, and is less felt in those opening south, east, and west. When the barometer is low north of the Alps, air is drawn in, rain falls on the southern slopes, and heat is set free. As the indrawn air descends on the leeward side into regions where the atmospheric envelope is thicker, it contracts and becomes more heated. It can thus hold more moisture as vapour, and blows as a hot dry foehn wind, which was long thought to come from the Sahara. In a few hours the foehn does the work of days of sunshine, and snow rapidly disappears. In some Alpine valleys the early sowings depend entirely on the foehn. In others it is counted on in autumn to ripen the grapes.

Glaciers and Glaciated Valleys. Above the snow-line the steep ridges and slopes are often bare of snow, which accumulates in the hollows. This snow, or *névé*, gradually changes by its pressure and by condensation and freezing at its surface into grains of ice. The most important snow-fields in the Alps are those of the Bernese Oberland, the Pennine Alps and Mont Blanc. From these, great glaciers, or ice rivers, crawl slowly down the valleys. The largest

is the Aletsch, in the Bernese Oberland, twelve miles long. At the lower end of a glacier the melting ice forms a river, which often hollows out a blue ice-cave, like that from which the Rhone emerges. Every glacier carries down on its surface accumulations of rock waste. These are called moraines.

In moving, the glacier wears away the surface of the rocks of the valley down which it passes and carries the loose materials thus accumulated onwards with it.

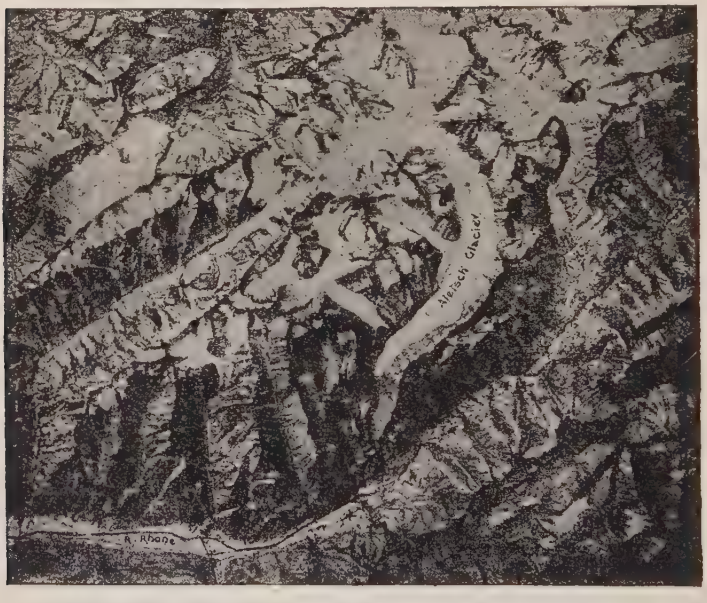


FIG. 21. The Aletsch Glacier and part of the Rhone Valley.

A certain proportion of the surface morainic material falls through the crevasses or fractures or sinks through the ice itself, thus increasing the bulk of what is called the ground moraine. Should the glacier diminish, the materials of the ground moraine left behind after the ice has melted are known as boulder clay, or till.

The Alpine glaciers were formerly much larger, filling all the main valleys, and carrying rock waste to the lower lands

at the base of the Alps. The hills round the Italian lakes and many irregularities of the Swiss plateau are remnants of old moraines. Where a valley has been glaciated its sides rise steeply from a flat floor to a shoulder above which an older gentler valley slope can be traced. A section across such a valley looks like Fig. 22. The main stream flows at the bottom in the U-shaped trough. The tributaries from the side valleys fall over the steep sides as waterfalls. Of such U-shaped valleys, Lauterbrunnen in the Bernese Oberland with the Staubach Fall, 900 feet high, is an example.

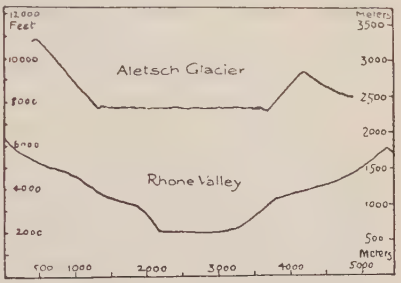


FIG. 22. Section of an Alpine valley.

Such valleys often end in cirques (see p. 48). The Swiss cirques are inferior to those of the Pyrenees. Higher up the mountain slopes are corries, sometimes filled by little tarns. The ridge line is sharp, rising here and there into toothed peaks. The lower ends of U-shaped valleys, from which glaciers have receded, often contain long narrow lakes.

The Alpine Lakes. Two such lines of lakes occur at the mouth of the parallel valleys opening north and south. The northern lakes include the Lac du Bourget in the Savoy Alps, Geneva in the Rhone valley, Thun-Brienz in the Aar, Luzern in the Reuss, Zürich, opening to the Aar valley, Constance in the Rhine valley, and smaller ones in the valleys drained to the Danube. Neuchâtel, in the Aar basin, at the base of the Jura, may have been similarly formed. The Italian lakes include Lago Maggiore in the Ticino valley, Como in the Adda, and Garda in the Mincio valley. Set among forested or snow-clad mountains their scenery is extraordinarily beautiful.

Zones of Vegetation. The succession of vegetation zones is well seen in ascending a Swiss valley. At first it is gay with fruit trees and patches of maize. On the northern

slopes maize and vines disappear about 2,000 feet, cereals and deciduous trees about 4,000 feet. Evergreen firs and pines succeed, between 4,000 and 6,000 feet, with rich meadows still higher, to which cattle are driven in summer. Above 7,500 feet isolated stunted trees are no longer seen, and between 8,000 and 9,000 feet the vegetation recalls that of the tundra. Above 9,000 feet is perpetual snow All these zones climb a little higher on the southern slopes.

Historical Summary. Three powers struggled in the Middle Ages for the control of the Western Alps: (1) Savoy, controlling the Mont Cenis route; (2) the Forest Cantons, controlling the St. Gotthard route, and (3) the Habsburgs in the Aar. The geographical superiority of the St. Gotthard enabled the Swiss Cantons to expand by alliance or conquest along all the routes opening from it. Savoy was pushed to the plains of the Po, where it became an Italian power, and the Habsburgs to the Danube, where the power of Austria developed.

Switzerland. Switzerland consists of the Central Alps in the south and of the Swiss plateau and Jura to the north (see Figs. 12 and 13).

Economic Conditions. Alpine Switzerland subsists by agriculture in the lower valleys, and cattle keeping in the higher valleys. Of the dairy industries that of condensing milk is most important. Villages are not found above 4,500 feet, but herdsmen's huts and hotels, both occupied only in summer, are built almost up to the snow-line. Wood is used for building, for fuel, and for making fancy articles in demand among tourists. Millions of persons visit the Alps annually and give employment to thousands of persons in varied capacities.

The plateau is an agricultural and manufacturing region. It possesses abundant and cheap water power in the rivers, a central position for obtaining raw materials, and intelligent and skilful labour. Silk is manufactured at Basel and Zürich, which procure raw silk from the Italian valleys by the

St. Gotthard. Cotton for the lace, embroidery and textile factories of Appenzell and St. Gallen comes by the Rhine to Basel. Watchmaking is one of the industries of the Jura towns, for which Geneva is the market. Machinery and electrical appliances are made at Winterthur and other centres.

Towns. These are either route towns, manufacturing towns or tourist centres. Constance, where the lake of Constance is constricted, Basel, where the Rhine turns north to the plain, Geneva, where the Rhone leaves that lake, Lausanne where the route from the north reaches it, Luzern, the key of the St. Gotthard, Zürich, commanding routes in many directions, and Bern, the Federal Capital, which links the Alps to the plateau by the Aar valley, are all route centres. They naturally develop into manufacturing towns because they easily obtain raw material. Among the tourist centres are the towns round the lakes of Geneva and Luzern, Bern and Interlaken in the Bernese Oberland, Zermatt, with fine glacier scenery, easily reached from the Rhone valley, Chamonix (in France) at the foot of Mont Blanc, and many others.

The Karpathians. Beyond the Central Alps is the Hungarian depression, set in an oval frame of mountains formed by the Karpathians, the Eastern and Dinaric Alps, and the Servian Highlands. The North Hungarian Ore Mountains and the Bihar Mountains, projecting into the plain from the Karpathians, are rich in minerals.

The outer continuous belt of the Karpathians begins in the Little Karpathians, which connects it with the Alps. It is continued to the south-east by the parallel wooded ranges and valleys of the Forest Karpathians, with fairly low passes. In the north the Tatra, a picturesque region with many small corrie lakes, rises to over 8,750 feet. In the south-east the mountain belt bends sharply and runs west as the lofty Transylvanian Alps, crossed by few good passes. The railway follows the Teregova or Mehadia pass, from the Temesh valley to the Valakhian plain, to which the Tran-

sylvanian Alps sink steeply on the south. On the north they are connected with the Bihar Mountains (cf. Fig. 24).

The Danube. Though the waters it carries are chiefly derived from Alpine snows the main stream of the Danube is not of Alpine origin. It rises in the Schwarz Wald, or Black Forest, which belongs to the Central European Highlands. The west to east trend of its tributaries, of which only the Inn comes from the Swiss Alps, has already been noticed, and this is on the whole the direction of the main stream. Its upper course separates the Alps from the Central European Highlands, which approach the Alps closely in the mountains of Bohemia. Here the river flows through the Austrian Gate, a magnificent gorge opening to the plain of Vienna, the key of the Danube. It leaves this plain by the gorge of the Karpathian Gate, between the Alps and the Little Karpathians, with Pressburg at its eastern end. The river divides into three main streams across the upper or Little Hungarian Plain, and flows through the Hungarian Gate between the Bakony Forest, with the shallow lake Balaton at its base, and the Hungarian Ore Mountains. Emerging from the upper plain it turns abruptly south across the Great Hungarian Plain. Budapest, the capital of Hungary, on spurs commanding the entrance to this plain, is the key of the middle Danube, and the converging point of many railways and river routes (see Fig. 24). The river now winds across a wide flood plain, till driven east by the coming in of the Drave. It turns south where the Tisza (*Germ.* Theiss) enters from the north from the Eastern Karpathians, rising near the Magyar Gate. After receiving the Save from the Dinaric Alps the river again trends east. The Hungarian bank is low and liable to flood, while the opposite Servian bank is high. The same contrast between the north and south banks is seen in the lower Danube, after it emerges from its last gorge, the *klisura*, by which it breaks through the Karpathians. At the end of the klisura, below the rapids of the Iron Gate, now rendered navigable, it enters the Valakhian plain, which forms

part of the kingdom of Romania. A small tributary leads by the Teregova pass to the Iron Gate, and is the easiest route from the Hungarian to the Valakhian plain. Flowing east between this low and often swampy plain on the north, and the edge of the Balkan foreland, which forms its high south bank, the Danube enters the Black Sea by a vast swampy delta. (For the whole paragraph see Figs. 18, 24, 25.)

Austria-Hungary. With the exception of Bohemia, Austria-Hungary belongs to the Alpine-Karpathian system. The Alpine provinces, Tirol in the Inn and Adige valleys, Salzburg round the Salzach, Styria in the Mur, Karinthia in the Drave and Karniola in the Save basins, together with the archduchies of Upper and Lower Austria, represent the heritage of the reigning Habsburg house. The Dinaric lands are Dalmatia, Bosnia-Herzegovina, and Kroatia, the latter Hungarian. The Karpathian lands are Moravia, Silesia, Galicia and Bukovina on the northern foreland, and Hungary.

The Alpine Provinces. The Alpine provinces resemble Switzerland. The mountains, though less high, often rise above the snow-line. The finest glacier scenery is round the Gross Glockner, in Karinthia; the finest rock scenery is in the Dolomites. In the Etsch and other valleys opening south, with warm winters, the vine and mulberry are cultivated. The eastern valleys have severe winters, and produce cereals. The valleys opening north have milder winters, but are too cold for the vine, which is cultivated on the Alpine foreland, especially in Styria. The provinces of the foreland, Upper and Lower Austria, Eastern Styria and Karniola, are richer and more populous than the mountain provinces of Tirol, Salzburg, and Karinthia, where agriculture is possible only in the valleys. In the higher pastures dairying is important in summer. The fine scenery of many parts makes the tourist industry profitable in summer. Minerals are fairly important. Salt is widely distributed, especially in the Salzkammergut; iron is abundant in Styria, especially round Eisenerz, and Karinthia; lead is found at Bleiberg in Karinthia, and in Karniola, and lignite in Upper

Austria and Styria. Mercury is mined at Idria in Karniola. Locally produced silk is manufactured in southern Tirol, round Trent. Manufactures are also developing in the Vorarlberg region, near the Swiss frontier (see Figs. 18 and 19).

The Alpine towns are connected with the chief routes.

FIG. 23. Routes from Vienna. The radius of the inner circle is 250 miles, that of the outer circle is 500 miles. The mountains and highlands are shaded. Cf. Figs. 18, 24, and 31.

Innsbruck, in the Inn valley, the capital of Tirol, commands routes north and east by the Inn, west by the Arlberg pass, and south by the Brenner. Trent is on the latter route. Salzburg, built where the Salzach enters the foreland, is the centre for the beautiful scenery of the Salzkammergut.

Passau, at the confluence of the Inn and Danube, is the meeting place of routes converging on the Danube above its gorge. Linz commands the entrance to the Austrian Gate. Vienna, the capital of Austria, at the exit, commands routes by (1) the Austrian Gate to (*a*) Ulm, the Rhine, and South Germany, (*b*) by Regensburg and also by (*c*) Prag to North Germany; (2) by the Moravian Gate (see Fig. 25) to the Oder, Baltic, and St. Petersburg; (3) by the Karpathian Gate to Hungary, the Black Sea and Constantinople; and (4) by the Semmering pass to the head of the Adriatic and the eastern basin of the Mediterranean. It is thus one of the keys of Europe, as well as a magnificent city, with great manufacturing and trading interests. On the Semmering route is Graz, the capital of Styria, where the Mur leaves the mountains; Laibach, the capital of Karniola, in the widest part of the upper Save basin; and Trieste, the Adriatic terminus and port. The only other important town of the Alps is Klagenfurt, the capital of Karinthia, on a tributary of the Drave, another important route centre.

The Dinaric Lands. The Adriatic coast has some good harbours, but access to the interior is difficult. Much of the region is of the karst type (see p. 32). Mulberries and olives are cultivated in the coastal valleys, which belong to the Mediterranean region. Fisheries are important in the Adriatic. Much of the interior is only fitted for keeping animals. The commerce of Trieste, the chief town and port, suffers from the lack of good railway communication with Hungary.

Hungary. Hungary consists of the Danube plain from the Karpathian Gate to the Iron Gate, and of the mountains surrounding it. In the north the Tatra and Hungarian Ore Mountains reach the Danube, where they meet the Bakony Forest, an outlier of the Alps, dividing the plain of Hungary into two unequal parts (see p. 57). In the south the Transylvanian Alps form the northern wall of the klisura. From the Transylvanian Alps the Bihar Mountains project north, forming the mountain province of Transylvania. In these mountain

areas forestry and mining and the pasturing of animals are the occupations, and towns are few. Koloszvar (*Germ.* Klausenburg), the capital of Transylvania, is reached from Budapest by a line which follows the parallel upper valleys of tributaries of the Danube to Brasso (*Germ.* Kronstadt), whence it is carried across the Transylvanian Alps into the Valakhian plain.

The plain of Hungary is essentially agricultural, producing the finest wheat and flour in the world. In the grass lands

FIG. 24. The Hungarian Plain and its bordering mountains. Land under 600 feet is white, that over 3,000 feet is black.

splendid horses are bred. Though the climate is extreme the vine is widely grown. Tokay, produced on the slopes of the middle Tisza valley, is the finest wine. Fruit is also grown, the plum predominating in the south. The minerals include coal and petroleum. Manufactures are little developed.

The towns of Hungary are strategic points. Poszony (*Germ.* Pressburg) commands the Karpathian Gate. Gran, at the lower

end of the Little Hungarian Plain, is the ecclesiastical capital. Budapest, a handsome and progressive city, built both on the high right and the low left bank of the Danube, is the centre of navigation up and down stream. Its geographical advantages are hardly inferior to those of Vienna. Szegedin, at the confluence of the Maros and Tisza, Debreczin, in Northern Hungary, and Arad, on the Maros, may be noted. The possession of the Adriatic district of Fiume gives Hungary a port for its wheat and flour.

Bosnia-Herzegovina, administered by Austria, was described on p. 33.

Galicia and Bukovina. These lands occupy the northern and north-eastern foreland of the Karpathians. The climate is extreme, with little rain. The highlands are forested and thinly peopled. The agricultural lowlands produce cereals and potatoes. Minerals, including petroleum, are abundant. Salt is mined at Wielicza, near Cracow, the old capital of Poland, which commands the route by the upper Vistula to the Moravian Gate and Vienna. The lines from Berlin by Breslau, and from Russia and Poland by Warsaw, unite at Cracow. From Cracow they are continued to Lemberg, another important town, where branches diverge to Southern Russia, while the main line is carried round the base of the Karpathians, and connects at Bucarest, the capital of Romania, with the lines from Vienna and Budapest.

Historical Summary. The Danube plain is accessible at many points. After the fall of Rome it was the pathway for the invasion of Central Europe, against which the Austrian or Eastern Mark, at the end of the Eastern Alps, was formed at the close of the eighth century. In the ninth century Asiatic Magyars entered by the Magyar Gate and the Tisza valley and the kingdom of Hungary grew up round Budapest. Invading Turks, entering by the Morava valley, challenged the control of the lower Danube, and Belgrad changed hands repeatedly. At its zenith Hungary held the Danube from the Alps to the Black Sea. Austria recovered

Vienna and entered on a long struggle with the Turks for the control of the Danube, which ended in the victory of geographical conditions. Austria was too firmly planted on the Eastern Alps to be dislodged. The Turks swept the Hungarians from Budapest, but failed to take Vienna. From this base the Hungarian territories were reconquered and the Turks driven beyond the Danube. The present emperor restored self-government to Hungary, and the dual monarchy of Austria-Hungary now corresponds to the double control of the Danube by Vienna and Budapest.

The attempt of Austria to expand along the other great Alpine valleys, the Rhine, the Rhone, and the Po, failed, chiefly because of the enforced concentration of power at Vienna. The loss of the Swiss and Italian possessions may be regarded as the price paid for the control of the Danube.

Romania. Romania consists of the steppe land of Moldavia, between the Karpathians and the Pruth, and of the lower Valakhian plain of the lower Danube, to the north of which the forested Transylvanian Alps rise sharply to over 8,000 feet. Many parallel valleys open south, drained by tributaries of the Danube. Along the Danube the Valakhian plain is low, swampy, and liable to flood, so that, as in the Po plain, the towns are away from the river. South of the swampy delta is the Dobruja plateau, rising from swamps along the Danube to steppes in the south. Constantsa, on the Black Sea, sixty miles south of the delta, dating from Roman times, the only seaport, is of artificial construction.

The climate is extreme. The lower Danube is ice-bound in winter. Wheat and maize are grown in enormous quantities. The chief fruits are the grape and plum. In the Karpathian area are valuable forests of oak, beech, and pine. In these and the mountain pastures swine and other animals are reared. In the same area salt and petroleum are mined. The chief towns are Bucarest, the capital, and the river ports of Braila and Galats.

Romania is accessible (1) by the Danube, (2) from the steppes

of Southern Russia, and (3) by easy passes across the Balkans. Rome reached it by the Danube. In more recent times Hungary, Turkey, and Russia have contended for its possession.

CENTRAL AND NORTH-WEST EUROPE.

Highlands and Lowlands. From the south-west of Ireland two belts of higher ground diverge—one to the south-east and east across Southern Great Britain and Central Europe, forming the Central European Highlands, the other to the north-east across Northern Great Britain and Scandinavia, forming the North-western Highlands. Between them a region of low heights, plains, and seas forms the Central Lowlands. Both lines of highlands are twice interrupted by sea. The first is broken by St. George's Channel, separating the highlands of South Ireland from those of South Wales and Southern England, and by the English Channel, separating the latter from the highlands of Britanny. The North-western Highlands are broken by the Irish Sea, separating the Irish Highlands from the Northern and Central Highlands of Great Britain, and by the North Sea, separating the Scottish from the Scandinavian Highlands. The Central Lowlands are broken by the North Sea, which cuts off the English from the continental lowlands.

Central European Highlands. The continental Central European Lowlands are further broken into distinct masses, joined by scarplands or separated by plains. The Britanny peninsula sinks in the south-east to the Gate of Poitou, beyond which rises the Central Plateau of France, drained by the Loire and the Dordogne. Scarplands lie between this plateau and the Channel, and between Britanny and the Ardennes and Vosges. These Northern French Scarplands are drained by the Seine and its tributaries. South-west of the Central Plateau are the plains of Aquitaine, drained by the Garonne, and leading by the Gate of Carcassonne to the Mediterranean. East of the Central Plateau the Saône-Rhone valley opens routes at the western foot of the Alps from the Gulf of Lions

FIG. 25. The Mountain Barrier North of the Mediterranean and the Highlands and Lowlands bordering it to the north. The gates leading from one region to another are marked. Cf. Fig. 26.

FIG. 26. Structure of Central Europe. Compare this very carefully with Fig. 25. The 'tables' of this figure are the 'scarps' of Fig. 25. The folded mountains are the young mountain chains which form the northern boundary of the Mediterranean Basin.

to (*a*) the North French Scarpland, or (*b*) between the Jura and Vosges by the Burgundian Gate or the Gate of Belfort to the Rhine Rift. This Rhine Rift is a long, flat, sunken area, covered with fertile alluvium, between the Vosges on the west and the Black Forest on the east. This the Rhine enters from Switzerland round the eastern end of the Swiss Jura. It leaves it by a narrow gorge cut through the Lower Rhine Highlands, an eastern continuation of the Ardennes. This steep-sided eroded gorge is very different from the wide flat-floored valley of the Middle Rhine.

Corresponding to the French Scarps west of the Vosges are the Franconian Scarps east of the Black Forest (Schwarz Wald). These are drained by the Main, flowing from the Bohemian Mountains, which form a diamond-shaped frame round the Bohemian depression. In the south the Bohemian plain gives place to highlands, higher in the Bohemian Forest (Böhmer Wald) on the south-west, and lower in the Moravian Uplands to the south-east, which are easily crossed to the Vienna Basin. In the north the Erz Gebirge rise to the north-west and the Sudetes to the north-east, the latter almost abutting against the Karpathians at the Moravian Gate. East of the Sudetes the Oder flows in the Silesian plain, beyond which rise the Polish Heights, drained to the Vistula at their eastern base.

Bohemia is almost entirely in the Elbe basin. The main stream rises in the Sudetes, and receives the Moldau from the south and the Eger from the west before it breaks through the tabular hills of Saxon Switzerland to the plain. The direction of the Sudetes can be traced in the Harz and Weser Mountains, and that of the Bohemian Forest in the Thuringian (Thüringer Wald) and Teutoburger Forests, the two converging in the north-west. The Saale drains the Saxon hills and plains to the Elbe between the Erz and Harz. The Fulda and Werra rise south of the Thuringian Forest and unite north of it to form the Weser, which breaks through the Weser Heights, forming the Westphalian Gate.

Notice the importance of the Fichtel Gebirge, the meeting-

place of the Erz, Bohemian Forest, Thuringian Forest, and Franconian Scarps. Four rivers flow from it, the Naab, south to the Danube, the Eger east and the Saale north to the Elbe, and the Main west to the Rhine. It is thus a meeting-place of important routes between west and east and between north and south.

Pay special attention to the various lowlands and the gates between them. At three points the Central Highlands approach the mountains to the south, and the narrow passages at these places have always been important. The Burgundian Gate lies between the Vosges and the Swiss Jura, and leads from the Saône-Rhone and Seine basins to the Middle Rhine Plain and the Northern Alpine Foreland. The Austrian Gate is the passage from this Alpine Foreland between the Bohemian Forest and the Alps to the Vienna Basin, out of which the Moravian Gate leads, between the Sudetes and the Karpathians to the plains of Eastern Europe.

These highlands are formed of rounded heights separated by valleys which form routes to the interior. The higher slopes are covered with dark pine woods and the lower slopes with deciduous forests. The valley floors are rich meadow or cultivated land.

The Central Lowlands are not a continuous plain. The west of the continental portion is low and marshy. Round the Rhine and the Ems and Weser it is often beneath the level of the sea, which is kept out by dykes. The Lüneburg Heath (Lüneburger Heide) comes between the Weser and the Elbe, east of which the Central German Lowland, with valley-lines converging on the Elbe and diverging to the east, must be distinguished from the Baltic Heights. The Baltic Heights are a morainic, lake-studded, pine-covered region, drained to south and north by the tributaries of the Trave, Oder, Vistula, Niemen, and Western Dvina, which break them into different masses.

The Northern Seas. Jutland and the islands of the Sound divide the Northland Sea into two shallow basins, the

North Sea and the Baltic. The inland Baltic receives much fresh water from rivers, and being fresher as well as in a colder winter area than the North Sea it freezes more easily. Its tidelessness permits the formation of lagoons (*haffen*) and deltas. The North Sea communicates with the Atlantic by the Strait of Dover and the English Channel in the south, and widens out in the north. It is salter than the Baltic, and its tides rise much higher, making its estuaries useful to shipping. Tides enter both by the north and the south. These reinforce each other at the Thames estuary, but neutralize each other off the Netherlands, where the Rhine delta is formed. The counter-clockwise circulation of the water in the Baltic and North Seas explains such features as the sand spit of the Gulf of Danzig, or the Frisian Islands south of the North Sea.

The Scandinavian Highlands. These rise gradually from the Baltic to a lofty plateau, which sinks steeply to the west and is penetrated by long fiords and fringed with islands. This is also the general characteristic of the British Highlands.

Natural routes. These natural divisions determine the main lines of communication. The Mediterranean can be approached directly only through the Gate of Carcassonne. It can be reached across the Seine scarps and by the Saône-Rhone valley. As the continent widens eastward the routes from north to south are more broken. The Rhine, the only river which crosses from the Alps to the Northland Seas, is one of the most important historical and commercial routes in Europe. Another north and south route crosses the eastern mountains where they are narrowest near the Fichtel Gebirge. The Danube forms a great east-and-west route north of the Alps between the Alps and Karpathians, and gives access by the easy Moravian Gate to the Oder and Vistula north of the Karpathians, and to the Elbe across the Moravian Uplands. The valleys of the Main, Eger, and Upper Elbe, form another west-and-east line, of more importance in the west

than in the east. Farther north are the routes of the Central German Lowlands, and finally the sea route from the North Sea by the Skagerak and Kattegat to the Baltic.

Climate. In Central Europe the climatic conditions differ from those of the Mediterranean in three respects. The winters are much colder, the summers are shorter and less hot, and the rainfall is more uniformly distributed over the year.

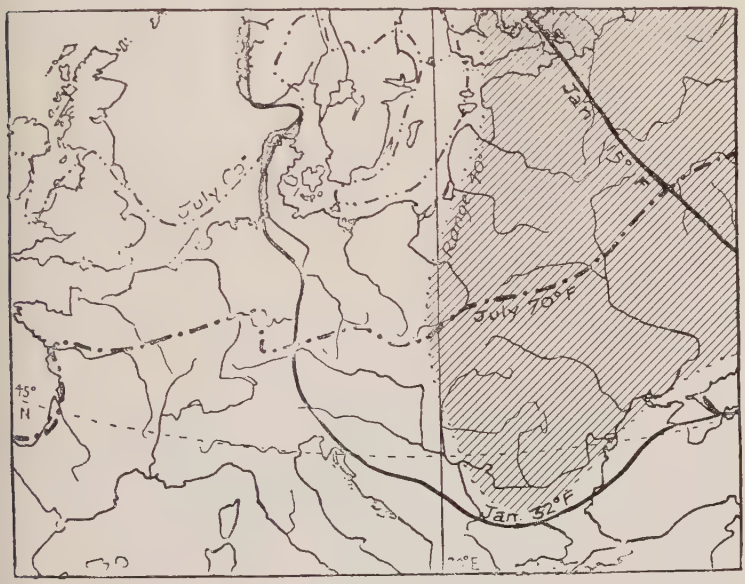


FIG. 27. Temperature in Central Europe. The isotherms of 32° F. for January and of 70° F. for July are shown, both reduced to sea-level.

The factors which influence the climate of Central and North-west Europe are (1) the prevalence of west or south-west winds, which lower the temperature in summer, raise it in winter, and bring rain at all seasons; (2) the fact that except in the British and Scandinavian Highlands the major feature lines run east and west, allowing the winds free access across

the continent; and (3) the presence of inland seas, which reinforce these effects.

We have seen (*Junior Geography*, pp. 26–31) that oceans and seas render the climate of surrounding countries equable. In Central and North-western Europe the prevailing winds come over the Atlantic Ocean, and reach Europe as cooling winds in summer, and as warming winds in winter. The isotherms for January over this region run almost north and south, so that the temperature at London is the same as at Lyon in the Rhone valley. Only in the east of the Scandinavian peninsula do they tend to run east and west. Elsewhere, if we leave elevation out of consideration, the cold increases almost uniformly with distance from the Atlantic, so that the January isotherms are nearly parallel.

The isotherm of 32° F., that is freezing point, runs in January south of Iceland to the Scandinavian coast, parallel to that coast and Jutland, and across Central Europe, continuing parallel to the line of the Dalmatian coast, the course of the Danube, and the northern coast of the Black Sea. West of this line, though frosts occur, they are rarely of long duration. The summer isotherms, on the other hand, run roughly parallel in an easterly and westerly direction, so that the summer heat varies approximately with latitude, though also to some degree with distance from the sea. The gradual rise of the land towards the south tends to neutralize the influence of latitude so that the differences of temperature are not so great as the ordinary map (which shows isotherms reduced to sea-level) appears to indicate.

Combining these results it follows that the climate of North-western and Central Europe is on the whole equable. In the north the winters are cold and the summers cool, but over the greater part the winters are cool and the summers warm.

The causes which make the climate uniform make the rainfall uniform. Except in Great Britain and Scandinavia, no coastal highlands running north and south wring out the

moisture from the Atlantic winds. There is a considerable difference between the rainfall of the west and east coasts of Great Britain, but the area of that island is small and the seas beyond are fairly wide, so that on reaching the continent the winds still contain a considerable amount of moisture. In the Scandinavian peninsula the land area is greater, the highlands more extensive, and the seas to the east smaller. There is a marked difference between the rainfall of Norway and Sweden, and the rainfall of Finland is also reduced. There is everywhere a perceptible diminution of rainfall from west to east, but no part in which the rainfall is actually deficient.

Vegetation. Most of Central and North-western Europe belongs to the West European region (see p. 3). In the extreme north it passes into the tundra (see p. 1), thinly peopled in summer by wandering Lapp herdsmen. The north is the region of coniferous woods; the south, of deciduous woods in the lowlands and coniferous woods in the highlands. Different trees characterize different landscapes. In England the oak and elm predominate, in France the poplar, in Germany the beech and the broad-leaved plane. In South Germany the acacia is a common woodland tree.

The lowlands of Central Europe are cultivated wherever the soil is sufficiently good. The moister west is the wheat-growing area, while in the east, where the rainfall is scantier and the soil frequently of poorer quality, rye is the chief cereal and the sugar beet an important crop. Hemp and flax are largely grown round the Baltic. Fruits are everywhere important. The apple, which needs autumn rains to swell the fruit, is the commonest orchard tree in England and Northern France. Farther east it is replaced by the cherry and other stone fruits. The vine is cultivated on the sunny slopes of the hills as far north as the middle Rhine and middle Seine valleys.

Minerals. The tin and lead mines of Britain and the amber of the Eastern Baltic early led to trade between the Mediterranean and Northern Europe. In Roman times gold, silver,

lead, and iron were obtained from Britain. When charcoal was the only fuel, iron was smelted in forested districts, as in the Weald. Charcoal is still used for smelting in the forests of Sweden and Russia, producing a fine quality of iron. The use of coal transferred the iron manufacture to the coalfields, many of which are near ironfields. Coal is found both in the North-western and the Central Highlands of Europe. In the former it occurs in small fields in Central

FIG. 28. The Coalfields of Central and Western Europe. The dotted belts show the areas where coal was formed in a littoral area and the parallel lines indicate where coal was formed in a continental area.

Scotland, and on the flanks of the Pennine and Welsh mountains in Great Britain. In the Central Highlands it is found along the northern margin in South Wales, France, and Belgium, Westphalia, Saxony, Silesia, and Poland. In smaller quantities it occurs in the heart of the highlands round the Central Plateau of France and in the Saar Basin. Brown coal, or lignite, is mined and used both in Germany and Austria. The map of Fig. 28 shows approximately the

continental and littoral areas during the formation of the older coal-beds.

Iron is found on the British, Franco-Belgian, Bohemian, and Silesian coalfields. The chief iron centres are in Central and Northern Sweden, round the margin of the Central Plateau of France, and in Lorraine. Much of the ore smelted in Britain and Central Europe comes from Spain. Zinc is found in Silesia and the Rhine Provinces and in Belgium. A little is found in Wales and Cumberland. Salt is found where old

FIG. 29. The Minerals of Central Europe.

desert-formed rocks have been preserved in the triassic strata of England and Germany. Building stones and brick-clay are found in most parts of Europe. See Fig. 29.

Economic Conditions. Most of this region is in an advanced stage of development. The forests have been extensively cleared, but forest industries are still important in Scandinavia and the Central European Highlands. In all highland regions the keeping of animals is more important

than agriculture. In the valleys the woollen manufacture often develops, as in Yorkshire or Saxony. Another industry of the highlands is mining. In the lowlands agriculture is the staple occupation outside the towns, which are the manufacturing and market centres. The most densely peopled regions are the manufacturing towns situated on coalfields (Lancashire, Belgium) and the ports. The river ports of the Rhine are hardly inferior to seaports in importance.

FRANCE.

France. France is sea-girt on three sides—(1) by the Channel and the North Sea on the north, (2) by the Atlantic on the west, (3) by the Mediterranean on the south-east. On three sides it is land girt—(1) by the Pyrenees in the south, (2) by the Alps on the south-east, and (3) by the Vosges and Ardennes in the north-east.

The Lowlands of France. From the Central Plateau, the core of France, lowlands open to each of the three seas. In the south the lowlands of Languedoc and Provence open between the Central Plateau and the Alps to the Mediterranean. A route leads between the Plateau and the Pyrenees by the Gate of Carcassonne to the western lowland of Aquitaine, which opens to the Atlantic between the Pyrenees and a line of high ground running from the Central Plateau to the Britanny Highlands. Across this higher ground a route by the Gate of Poitou leads to the French Scarplands. These rise in the east to the Ardennes and Vosges, and command sea routes east by the North Sea to the Baltic and northern Europe, and west by the Channel to the Atlantic.

Each lowland has its characteristic climate. Provence and Languedoc are Mediterranean. Aquitaine has milder winters and cooler summers, and a heavier and more uniformly distributed rainfall, marking the transition to the climate of north-west Europe. In the French Scarplands the summers and winters are cooler, and the rainfall is less than in Aquitaine, and still more uniformly distributed throughout the year.

Climatic regions well-marked.

The Highlands of France. Only the Central Plateau and the Britanny Highlands are wholly in France. The Central Plateau has cold winters, hot summers, and rain at all seasons, but most in summer. The Britanny Highlands have milder winters, cooler summers, and most rain in winter. The

FIG. 30. Routes and Towns of France.

climate of the Alps and Pyrenees has been described. The Ardennes and Vosges have colder winters and warmer summers than the adjacent scarplands.

Contrast between the Highlands and Lowlands. Orographically and climatically the Central Plateau, or

Auvergne, and Britanny are distinguished from each other and from the rest of France. Their tendency to individualism in occupations, customs, and even in religious and political ideas, is as marked as the tendency to solidarity in the lowlands, where intercommunication is easy. In the latter the convergence of routes on certain centres is accompanied by a concentration of other influences and interests. Aquitaine is focussed at Bordeaux the marginal and Toulouse the internal centre; the southern lowland at Marseille on the margin and Lyon in the interior; and the French Scarplands at Rouen and Paris. The natural centre of all these is Paris, the geographical as well as the political capital.

Languedoc and Provence. Languedoc west and Provence east of the Rhone form an undulating lowland. The coastal belt, rising in Provence to a hilly interior, passes west of the Rhone delta into a wider belt of lowland bordered by lagoons (*étangs*) with important fisheries. On this broad lowland and the lower hill slopes to the north are vineyards and oliveyards, with mulberries for silkworms at higher elevations. The Rhone valley carries these Mediterranean conditions far into the interior. Historically it has been closely connected with the Mediterranean. In the south, it is accessible from the Gulf of Lions, where Marseille is one of the oldest cities of the Western Mediterranean. In the east, the routes from Italy across the Alps converge on Lyon, in the centre, which was the Roman capital. The Romanization was very complete, the name of Provincia still surviving in Provence. The Roman antiquities at Vienne, Orange, Arles, Nimes, &c., vie with those of Italy. This close connexion with Italy lasted into the Middle Ages. The Popes resided at Avignon for the greater part of the fourteenth century, and the city belonged to the Roman See till 1791. Langue d'Oc and Provençal were the languages in use, and both are still spoken and written side by side with French. Next to Italian, Spanish influence predominated (see p. 48). The plain of Roussillon, with Perpignan, was alternately French and Spanish. Montpellier,

with its famous schools of law and medicine, was included in the kingdom of Aragon. This Spanish influence was focussed at Narbonne. At a later date such centres as Montpellier and Nimes were strongly favourable to Protestantism.

The modern industries utilize either local products or the tropical produce imported into Marseille. Lyon is the centre of the silk manufacture, carried on both as a home industry and in large factories supplied with coal from St. Etienne. Nimes, south of the Alais coalfield, which supplies its factories, and Avignon are other centres. Wine is made everywhere, but the trade centres at Cette, which imports wine from other Mediterranean countries to blend with local vintages. Marseille, on a rocky and deeply indented shore, is the centre of French trade with the tropics. Palm oil, copra, &c., are imported for the soap and candle manufactures, which are the most important of many flourishing industries. Toulon, with a fine harbour, is the Mediterranean naval station. East of this is the Côte d'Azur, or Riviera, with Nice and other picturesque winter cities, including Monaco, a small independent principality.

The steep mountain margins of the Alps and the Central Plateau, the latter known as the Cevennes, are pastoral, the flocks being driven up to the mountains in summer and down to the Crau and Camargue plains in the Rhone delta in winter. Local coal supplies Béziers and other small woollen manufacturing towns of Western Languedoc. The great coalfield of St. Etienne, in the north, is an industrial region engaged in mining, iron manufactures of every kind, especially firearms, and ribbon making. Gloves are made in many Alpine villages, of which Grenoble is the market. Chambéry, the second Alpine centre, long the capital of Savoy, has silk and other manufactures as a consequence of its position on the Mont Cenis route.

Aquitaine. The Garonne basin was also originally outside France proper. Toulouse was the capital, first of the Roman and later of the Visigothic conquerors. Gascony (Vasconia or Basqueland), on the northern slopes of the Pyrenees, is the

link between France and Spain, passing to the former late in the sixteenth century. Guienne, to the north, held by England for three centuries, was incorporated a century earlier. In this transition region cereals are as important as the vine. The claret trade centres at Bordeaux, on the Gironde estuary. La Rochelle is the port for the district north of the estuary. South of the Gironde the coast is bordered by sand-dunes, or *landes*, kept from creeping inland by planting pine forests, which yield turpentine and protect vineyards. The people of Gascony, a poor pastoral region, have always been adventurers. Basque harpooners for centuries monopolized the Arctic whale fisheries. Bayonne, in the south, controls the routes to Spain, and to the health resorts of Biarritz and Pau.

Small coal and iron fields round the margin of the Central Plateau support woollen, iron, and pottery manufactures, the latter important at Limoges.

The Central Plateau. The rugged central core of France slopes gently to north and west, and steeply to south and east. The rifts of the Loire, and its tributary the Allier, cut right across the plateau, and afford the only practicable routes across it to the Rhone valley. In the rainy north-west cattle are kept on the granite pastures of the Millevaches plateau. In the drier, more porous limestone regions, known as the Causses, they are replaced by sheep. The Causses are of the karst type (see p. 32). The rivers cut deep canyons, the most famous being that of the Tarn, with its brilliantly coloured rock walls, a quarter of a mile high and half a mile apart. Subterranean rivers are common. The canyons are often narrow, precipitous, and difficult of access, but elsewhere they are broad enough for villages and orchards. The bleak Causses above have hardly a habitation. Parts of the plateau are volcanic, exhibiting the same contrast between the barren lava flows and the valleys filled with deep fertile soil as in the volcanic districts of Southern Italy. The richest valley is the broad Limagne, or valley of the Upper Allier, growing vines and cereals. Here is Clermont Ferrand, the chief town of the

plateau, near the base of the extinct Puy de Dôme. In the volcanic districts watering-places have grown up round mineral springs, as at Vichy and Mont-Dore. Elsewhere the villages are small, and life is simple, to the verge of rudeness.

Britanny. Britanny consists of three strips of lowland, separated by belts of hills. The fertile strip along the Channel, where fisheries are as important as agriculture, market-gardening, and dairy-farming, has always been the populous part. The Breton is a daring fisherman, going afield to the fisheries of Newfoundland and the Arctic seas. Our British ancestors are among the many races who have found asylum in these highlands, leaving behind stone circles and other prehistoric monuments, as well as strange legends and superstitions.

Except Rennes, the towns are ports. Brest, in the west, is the Atlantic naval station. St. Malo, opposite the Channel Islands, supplies the English market with early vegetables and dairy produce.

The Lower Loire Provinces. The provinces of Anjou, Maine, and Touraine are the garden of France. Orléannais, farther east, is the link with the Seine, and Poitou with Aquitaine. Owing to the fact that the Loire flows over impermeable rocks the river is liable to destructive floods, and is difficult of navigation. The varied products include the vine and cereals. This fertile region was once Norman, but later passed to France, and became with the Seine basin the nucleus of modern France. Its many towns, imposing chateaux, witness to long prosperity and relative security. Orléans, Blois, and Tours control the Loire. Angers commands the entrance to Maine. Nantes, at the head of the estuary, is the chief port.

The Northern Scarplands and their Margins. This part of France has resemblances to Southern England, with which it was once connected by land. The chalk formation of south-east England is continued on the French side of the Channel, succeeded in the south and east by limestone scarps like the Cotswolds. Between these chalk and limestone heights are clay plains, in which wheat-growing and dairy-farming are

important. The higher pastures graze sheep. The steep southern scarps are terraced for the famous vineyards of Champagne and of Burgundy. Only in the east, on the borders of the highlands, where iron ores occur, are there small industrial centres.

The broken formation of the Northern Scarplands favoured the growth of independent powers—Normandy, Artois, Burgundy, &c.—which were gradually absorbed by conquest or inheritance into the expanding French monarchy.

Burgundy, established on the scarps overlooking the Saône, and commanding the routes from the Rhine and the Rhone to the Seine, was long a powerful rival to the power centred at Paris. Dijon, the capital, on a tributary of the Saône, controls the route from the Rhone, which climbs the scarps and follows the Yonne and Seine to Paris. Farther east the route from the Rhine by the Burgundian Gate, where Belfort guards the passage between the Jura and the Vosges, climbs to the plateau of Langres, and reaches Paris by Troyes and the Seine.

Lorraine is isolated between the Vosges and the limestone heights east of the Meuse. It connects the Seinelands with the Rhinelands. Nancy in France and Metz in Germany, both manufacturing centres, control the routes across it.

Champagne, a region of wet clays and dry chalk, lies between Burgundy, Lorraine, and the heights which border the Ile de France. It is a link between the vine-lands of France and the down-lands of Northern France and Southern England. Troyes and Chalôns-sur-Marne in the chalk, and Reims and Laon at the base of the Ile de France heights, control the routes to Paris by the tributaries of the Seine.

The **Ile de France** is the geographical and historical nucleus of France. All the river valleys converge on Paris, which has grown up round islands in the Seine, here encircled by easily fortified heights. Its ancient buildings include the fine cathedral of Notre Dame, and the modern city is spacious and handsome. The main routes converging

on the capital are shown in Fig. 31. The navigable Seine links it with the sea.

The Channel Lands. Normandy resembles the South of England, with which it was politically united for a century and a half after the Norman conquest, in scenery, occupations,

FIG. 31. The Routes from Paris. The higher land is shaded. The radius of the inner circle is 250 miles, that of the outer circle is 500 miles. Cf. Fig. 23.

and indications of long prosperity. Wheat and apple orchards are found in the valleys, and dairy cattle in the river meadows. The drier hill-pastures are grazed by sheep. The cultivation of the sugar-beet is important in the east. The coastal towns are ports. Cherbourg, on the Cotentin peninsula, is the

Channel naval station. Le Havre, where the Seine breaks through the chalk heights to the sea, is 'the haven' of Paris, as well as of Normandy. Inland are many fine old towns and famous cathedrals. Rouen, on the Seine, at the head of ocean navigation, obtains cheap coal and raw material by water, and has become the centre of the French cotton industry. Amiens, manufacturing textiles on a smaller scale, is similarly related to the Somme. Amiens controls the great routes to the north. That to England runs by the Somme and the coast to Boulogne and Calais; that to Belgium passes by Lille and the river Lys. A southern route to the east follows the Oise and Sambre. East of the Seine are the ports of Dieppe, Boulogne, Calais, and Dunkirk, the latter the outlet for the industrial towns at the western end of the Franco-Belgian coalfield, the French centre of which is round Valenciennes. Lille, an engineering centre, is the industrial capital of the north, and Roubaix a great textile centre. Famous old towns are as numerous as in Normandy and Picardy.

The Channel Islands. Politically under the British Crown, to which they passed at the Norman Conquest in 1066, the Channel Islands, Jersey (45 square miles), Guernsey (25 square miles), Alderney (4 square miles), and Sark (1⅔ square miles) are geographically part of France. They rise above a shallow platform, which runs westwards from the Cotentin peninsula. They are formed of old, hard rock, which weathers into steep cliffs. Owing to this and to dangerous currents they are very difficult of access. French blood predominates, and a dialect of Norman French is spoken. Jersey, 15 miles from the French coast and 88 from Portland Bill (capital St. Helier), is engaged in dairy-farming, and the growing of early fruits and vegetables. Fisheries and the tourist industries are additional resources. Guernsey (capital St. Peter's Port) is similarly engaged, and has granite quarries. All the islands, the last remnant of the once great English possessions in France, have self-government.

Historical Summary. The Romanization of Gaul was

chiefly effected by the Alpine passes leading to the Rhone valley. Hard fighting was necessary to secure the routes round the Central Plateau. What Lyon, which commands routes to the Mediterranean lands, was to Roman Gaul, Paris, which commands routes to the lowlands of France and of the North Sea lands, was to mediaeval and modern France. Clovis (508) made Paris the capital of the Franks, who drove the Visigoths to the Pyrenees and pushed back the Burgundians. Charlemagne, or Charles the Great, extended his dominions far beyond the Rhine into Switzerland, Austria-Hungary, Italy and Spain (see p. 112). His empire was divided among his grandsons in the middle of the ninth century. The topography of France favoured the rise of great feudal lords (Flanders, Champagne, Burgundy, Anjou, Aquitaine, Normandy, Britanny, &c.), who vied in power with the king. The royal power, based on Paris, the geographical capital and route centre, gradually absorbed these rivals and became the nucleus of modern France. It was specially vulnerable to attacks from England, which from various dynastic causes controlled many powerful French fiefs. This constant menace indirectly contributed to the unification of the country. In the thirteenth century the English power in France declined, but in the middle of the fourteenth century a new tide of English expansion in France led to the Hundred Years' War, during which France was often in alliance with Scotland, on the English rear, and England with Burgundy, then one of the most powerful states of Europe, on the French flank. The Hundred Years' War ended with the downfall of the English power in France. The annexation of Burgundy in 1477, which made France safe in the east, was soon followed by the acquisition of Britanny. In the seventeenth century the debatable lands of Artois, Roussillon, and Alsace were acquired. Expansion to the Rhine next became the aim of French policy. This was achieved by Louis XIV and Napoleon, but France was finally dislodged by the war of 1870. The expansion of France across the Mediterranean

into Algeria may perhaps be compared with the mediaeval expansion of England across the Channel into France.

Belgium. Belgium links Northern France to the lowlands of the Rhine and North Germany. It consists of the plains of Flanders and Brabant in the north, and of the wooded Ardennes in the south. The plains rise gradually in the south to the heights of Hainaut and Hesbaye, which are drained by north flowing rivers to the Lys-Schelde and its tributary the Demer. The coast is sandy, with no good natural harbours. Ostend, on the coast, Bruges and Ghent [1] connected with it by canal, and Antwerp, at the head of the dredged estuary of the Schelde, are all artificially improved. Of these Antwerp [2] is far the most important. It is the nearest port both to the industrial towns of the Lower Rhine, with which it is connected by rail and canal, and to the Transatlantic sources of raw material, which it imports in enormous quantities.

The resources of the Belgian plain are utilized to support a very dense population. The soil is divided into small holdings, cultivated to the highest degree of productiveness. Cereals, sugar-beet, and flax are typical products. Cattle and horses are bred in the rich water meadows. The lowlands are covered with a network of railways and canals, providing cheap transport. Belgium has long been noted for its manufactures, of which lace and linens, made of local flax, carpets and tapestries, made from Ardennes wool, are examples. Water power, so important in the Middle Ages, was supplied by the streams from the Ardennes, and many rivers possessed special bleaching properties, making its linens famous. The historic industries are carried on at the old centres—Ghent, Bruges, Brussels,[3] the capital, Mechlin,[4] Louvain, &c.—but the power is now supplied from the Franco-Belgian coalfield, which runs south of the Hainaut-Hesbaye Heights. Mons, Charleroi, and Liège, in the centre of the mining districts, carry on iron industries.

The Ardennes region of forests and pastures is less thickly

[1] *Fr.* Gand. [2] *Fl.* Antwerpen, *Fr.* Anvers. [3] *Fr.* Bruxelles. [4] Malines.

peopled. The Sambre-Meuse valley cuts its northern margin, opening a route between Paris and the Rhine, which goes by Namur and Liège to Aachen[1] and Cöln.[2] The struggles for this east and west route have led to such military operations as the campaigns of Marlborough and the battle of Waterloo.

The close relation between Belgium and the Rhine delta or Holland, has led to an occasional union between the two countries, which has never proved permanent. In the fifteenth century both belonged to Burgundy and passed by the marriage of the heiress to Spain. The Dutch Netherlands freed themselves in the sixteenth century, but the Belgian Netherlands remained Spanish till 1713. In 1815 they were again united to Holland, but in 1831 Belgium declared itself an independent kingdom. Its neutrality is guaranteed by the European powers.

HOLLAND, THE GERMAN EMPIRE, AND BOHEMIA.

Natural Regions. The feature-lines of Europe north of the Alps run east and west in parallel belts. These are (1) the Alpine Foreland; (2) the Central Highlands; (3) the Central Lowlands; (4) the Baltic Heights. They are crossed by rivers flowing from south to north—(1) the Rhine, crossing the first three; (2) the Ems, Weser, and Elbe, crossing the second and third; and (3) the Oder and Vistula, crossing the last two. The resulting natural regions are shown in Fig. 25.

These natural regions may be arranged in two groups—(1) the Northern Lowlands, with low hills on their margin, separated by a broad belt of highlands from (2) the more isolated plains of the south, with higher hills on their margin. The first are inhabited by the long-headed, fair-haired North European race, the second by the round-headed, dark-haired Alpine race, indicating that movement of races has been from east to west rather than from north to south. Communication

[1] *Fr.* Aix-la-chapelle. [2] *Fr.* Cologne.

in the latter direction must follow either the Rhine, which crosses the Central Highlands in a narrow defile, or the wooded passes of Hesse and Eastern Thuringia. Of the three, the Rhine is far the most important. Not merely does it link the North Sea with the Alps, but with that section of the Alps

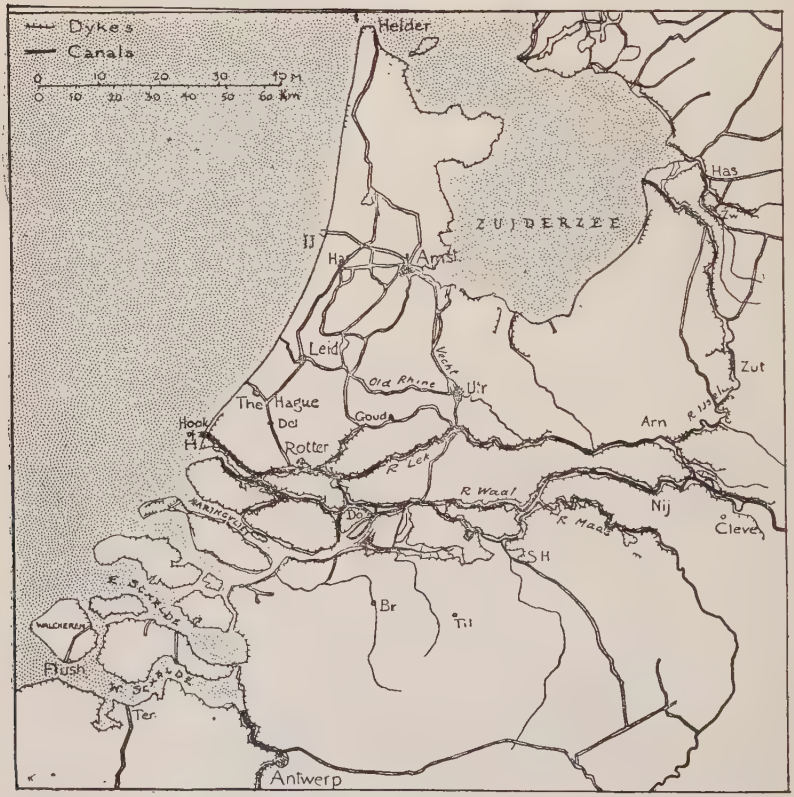


FIG. 32. The Netherlands. Waterways and Dykes.

where the entire system can be crossed to the Mediterranean by single passes, such as the St. Gotthard, or Splügen. That it is not an ideal route between north and south, and that political unification is easier from east to west, is shown by its divided political control, Swiss, German, and Dutch.

The Rhine. (See *Jun. Geog.*, pp. 134–7.) The course of the Rhine is divided into five very different parts. (1) The Alpine Rhine, cut across the Alps and the Alpine foreland, with an abrupt fall in the river-bed at Schaffhausen; (2) the long, broad rift valley stretching from the Jura to the Lower Rhine Highlands, and lying between the Black Forest and Vosges, divided between Baden and Hesse on the east, and Alsace and the Palatinate on the west; (3) the gorge, through the Lower Rhine Highlands, politically in Prussia; (4) the plain, also Prussian; and (5) the delta, the nucleus of the kingdom of the Netherlands.

The Netherlands. (See *Jun. Geog.*, p. 138.) The delta of the Rhine, backed by the Bourtanger and other moors, is difficult of access on all sides. Much of it lies below sea-level, and is liable to inundation from sea and river. It is extensively dyked to secure it against flood, and its marshes are drained by cutting innumerable canals.

FIG. 33. Section across a Dyke in Holland.

The modern kingdom of the Netherlands consists of three parts. (1) North Holland, or West Friesland; (2) Holland proper, in the west; and (3) North Brabant and Gelderland, in the south-east.

North Holland, or Friesland, is a boggy region east of the Zuider Zee. Its peat moors have been extensively cleared and drained, forming meadows suited both for agriculture and cattle-breeding. The routes converge on Groningen, at the edge of the area liable to flood, where manufactures are growing.

Holland proper consists of the delta, crossed by the distributaries of the river out of whose sediment it has been formed. The reclaimed lands, protected in some cases by dykes 60 feet high, with roads and canals on the top, form

polders of deep fertile soil. The work of reclaiming the shallow Zuider Zee is in progress. The sea is bordered by sand-dunes, and wooded beyond the Hague. The old river broke through this coastal belt at Leiden. Two breaks of more commercial importance are the North Sea Canal to Amsterdam, on the Zuider Zee, and the Lek in the south, which has been canalized to Rotterdam, the port of the Rhine. There is another entrance at Flushing (Vlissingen), on the south arm of the Schelde, which communicates by inland channels with the Rhine by way of Dordrecht. The key of Holland is Utrecht, on the old main stream, above the flood-level, from which the low deltaic region can be inundated by opening the dykes.

The occupations of Holland are agriculture, dairy-farming, and gardening. Some of the manufactures, e.g., printing at Leiden, have long been famous. Many utilize the tropical produce brought from the Dutch colonial possessions. Fisheries are important along the coast. They had their share in training the seamen who laid the foundation of the Dutch oversea trade and colonization, which have so enriched the Netherlands.

South-east Holland (North Brabant and Gelderland), a drier, sandier region, is best suited for sheep-breeding. Industries are developing in the towns near the rivers, the most important of which is Maestricht, on the Maas, or Meuse.

Historical Summary. The marshes of the Rhine delta favoured the independence of the tribes who inhabited them, though these might own nominal allegiance to Roman, Frankish, or Holy Roman Empire. For the same reason feudal barons were able to make good their authority against outside influence. The rich manufacturing cities, in their turn, were virtually independent of their feudal superiors. Holland formed part of the Burgundian dowry, which passed first to Austria and then to Spain, by the marriage of the heiress in the fifteenth century. Holland always resented the Spanish yoke, and threw it off in 1579, forming itself into the Dutch Republic. To the survival of this republic then, and in its

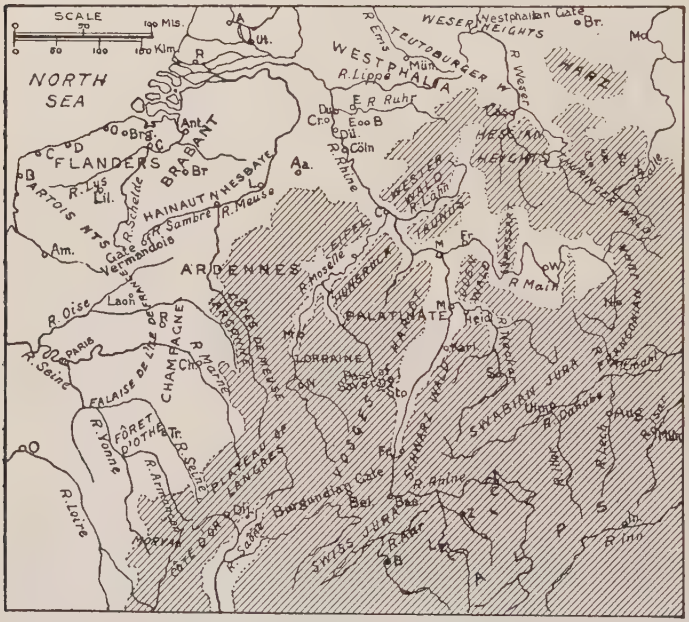
later form, the kingdom of the Netherlands, the geographical position and character of the country largely contributed. The closing of the Spanish ports to Dutch traders led the Dutch to found a colonial empire in the West Indies. In the seventeenth century Holland owned more shipping than any European country. The maritime power declined in the eighteenth century, at the close of which it was seized by France, and soon after lost Ceylon and South Africa to Britain. It was united with Belgium for a few years after Waterloo, but the two countries are now politically distinct.

The Westphalian and Prussian Rhine Plains and their Margin. These lie between the marshes of the Netherlands and the Lower Rhine Highlands to the south. They are drained by the Ems in the north, and in the south by the Rhine, and its tributaries, the Lippe and the Ruhr.

The Westphalian plain, a continuation of Holland, is engaged in agriculture, and horse and sheep-breeding. Münster, the capital, has breweries, distilleries, and textile industries. The Ruhr valley contains one of the richest coalfields in Europe.

In the very similar Rhine plain the chief town is Cöln (*Fr.* Cologne), whose name represents the Roman Colonia Agrippina. Situated not far below the exit from the Rhine gorge, it is the crossing-point of routes from plain and highlands, and as such has been important from Roman times. Under the Holy Roman Empire its prince-bishop possessed large temporal powers, and a vote for the election of Emperor. Later, the town became a member of the Hanseatic league. It is now a great port, and the centre of a densely peopled industrial region, which extends to the Ardennes in the west, and over the Westphalian coalfield in the east. In the former woollens, gloves, and leather, from raw materials originally supplied from the Ardennes, are the chief manufactures at Aachen (*Fr.* Aix-la-Chapelle), one of the oldest cities in Germany. Crefeld, well situated for obtaining Westphalian coal, is the centre of the German silk industry.

The Ruhr and Sieg valleys form one of the busiest industrial regions in Europe, where population has doubled within a few years. Textile and iron industries are important at Barmen-Elberfeldt. At Essen the Krupp gun-factories alone employ 30,000 hands. Dortmund manufactures railway rails and girders, and rolling stock. Iron manufactures are also important at Düsseldorf and Duisburg, the river ports of this district.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NORTH SEA
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R. Loire
R. Saône
R. Rhône
R. Ems
R. Weser
R. Lippe
R. Ruhr
R. Lahn
R. Main
R. Neckar
R. Danube
R. Inn
WESTPHALIA
TEUTOBURGER WALD
WESER HEIGHTS
HARZ
HESSIAN HEIGHTS
THURINGIAN WALD
WESTER WALD
TAUNUS
EIFEL
HUNSRÜCK
PALATINATE
HARDT
CHAMPAGNE
LORRAINE
FALAISE DE L'ILE DE FRANCE
FORÊT D'IOTHE
PLATEAU de LANGRES
Burgundian Gate
SWABIAN JURA
SCHWARZ WALD
JURA
CÔTE D'OR
CÔTE D'ARGENT
MORVAN
Westphalian Gate
Br.
Mü.
Ms.
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is controlled by Coblenz, at the confluence of the Mosel, and Metz, on which the routes from France across Lorraine converge.

The Middle Rhine Plain. The broad middle plain of the Rhine rises to the Vosges on the west, and the Black Forest on the east, both with rounded summits and densely forested slopes. The lower slopes are terraced for vineyards, above which rich meadows rise to the forest edge. Agriculture is the chief occupation. Industries are carried on by water-power in many valleys as domestic industries, and in modern factories in Mülhausen and other towns of the Vosges.

The Rhine forms a natural route between north and south, and is followed by railways on both banks. The great port of Mannheim, at the Neckar confluence, is artificially formed on low-lying land protected by dykes from flood. Its manufactures and commerce are very great. Of long-standing importance are (1) Mainz,[1] commanding the routes across the Palatinate and Lower Lorraine, (2) Strassburg, guarding the Saverne or Zabern pass into Upper Lorraine, and (3) Frankfurt, which controls the routes north through Hesse, and south by the Main to Bavaria and the Danube, (4) Karlsruhe, with engineering works, commands the route across the Neckar Plateau, between the Oden Wald and Schwarz Wald, to the Danube. Heidelberg, where the Neckar gorge opens to the Rhine, and Freiburg, at the mouth of a lovely valley of the Schwarz Wald, are university towns. Basel, the frontier town of Switzerland, commanding the route through the Burgundian Gate, is the point at which traffic from all directions reaches the Rhine.

The Franconian Scarps. The Franconian Scarps correspond in the east to Lorraine in the west, but though they are a larger, more self-contained region, they lead to less rich lands. The alternation of limestone scarps and clay plains recalls the Cotswolds and Upper Thames. The Neckar, on which is Stuttgart, the capital of Württemberg, forms a route

[1] *Fr.* Mayence.

to Ulm, on the Danube, a fact which accounts for the independence of Württemberg. The Bavarian part of this land, is concentrated round the route between the Main and the Danube. This goes by Würzburg, on the main stream, and Nürnberg, on its sub-tributary the Pegnitz, an ancient city, with many manufactures and the largest hop-market in Europe. The Pegnitz is connected by a canal 108 miles long, following the Altmühl to Regensburg on the Danube, a fact illustrating the easy character of this natural route between the Danube and the Rhine.

The Danubian Alpine Foreland. Many tributaries, the Iller, Lech, Isar, and Inn, descend from the Alps and cross the Danube foreland in parallel valleys. Agricultural, pastoral, and forest occupations preponderate, with a little industry. Lying between the Alps and the Franconian Scarps, with rich regions on either side of the barrier, the routes across the Danube foreland are extremely important, and have led to many battles, of which Blenheim is the most famous. Trace on the map the two main routes between east and west. One follows the Danube at the base of the Franconian Scarps, going by Ulm (where the river becomes navigable), Donauwörth, Regensburg, and Passau. The other is at the base of the Alps, going by Ulm, Augsburg, and Munich,[1] the capital of Bavaria. The south to north routes go by the Inn to Regensburg, which commands routes by the Main to the Rhine or across the Thuringian Highlands. Another goes by the Seefeld pass to Munich, and thence to Augsburg and Ulm.

The kingdom of Bavaria, the largest of the South German states, is thus composed of three different regions: (*a*) the Alpine foreland between the Inn and Iller, (*b*) the Franconian Scarps, and (*c*) the Palatinate.

Bohemia. The Bohemian diamond, though belonging to the Central Highlands, is most easily entered from the Danube across the Moravian Highlands. It can also be easily reached from Silesia by the upper Oder and its tributaries

[1] *Germ.* München.

(e. g. the Neisse by Glatz). This route has been contested in Austerlitz and other battles. Its relative isolation from German influences is shown by its Slavonic population of Chekhs. Its king is also Emperor of Austria.

Bohemia is a region of forested hills and cultivated valleys, with a lowland area in the north. The capital is Prag, in the

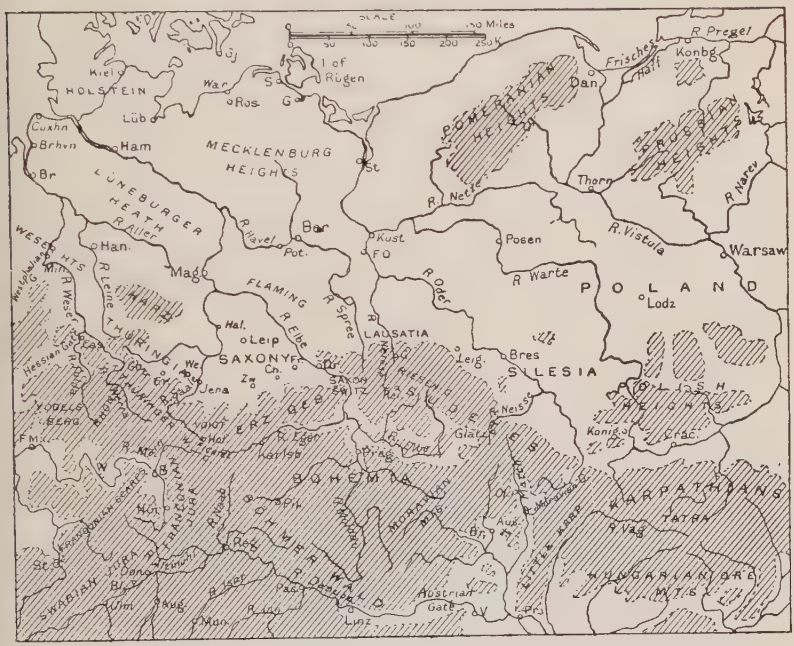


FIG. 35. Lowlands, Heights and Highlands east of the Weser. The higher land is shaded. This figure should be carefully studied and compared with a good orographical map.

centre, at the head of the navigation of the Moldau, and the crossing-point of many routes. Extensive faulting in the north is accompanied by the presence of famous mineral springs, as at Karlsbad. The Highlands are rich in coal, which supply the woollen towns, of which Reichenberg, near the foot of the Riesen Gebirge (Giant Mountains), is the most

important. The decomposing crystalline rocks make the manufacture of glass and pottery important.

The Northern Margin of the Highlands. On the northern margin of the Highlands are Saxony and the States of Thuringia and the Hessian Hills.

Saxony. The kingdom of Saxony occupies the northern slopes of the Erz Gebirge,[1] whose name indicates the wealth of minerals. Of these coal is now the most important, and has greatly stimulated manufactures. The chief mining centres are Freiberg and Chemnitz. The iron industries are naturally important. Saxony has long been famous for sheep, and its woollens are renowned. Still more important is the cotton textile industry at Chemnitz, Zwickau, and other centres. The route between north and south goes by Voigt land, through Hof, which is within Bavarian territory, to Leipzig, with its famous printing industry. The capital is Dresden, where the Elbe issues from the narrow gorge it has cut through the picturesque region known as the Saxon Switzerland.

Thuringia. The region between the forested highlands of Thuringia and the rounded, wooded Harz consists of fertile valleys separated by more arid plateaus, or wooded hills. The isolated Harz can be avoided by a détour, but the Thuringian Forest must be crossed in going from north to south. Hence the latter is divided into many petty states, each owing its existence to the control of one or more routes. Most valleys open north to the Saale, and near their mouths are built the towns, of which Erfurt, Gotha, Weimar, and Jena are the most important. Jena and Leipzig, on the main route between south and north, were the scene of battles in Napoleon's German campaigns.

The Harz is rich in minerals, which are mined in the lower valleys, at the mouth of each of which is a little town.

Hesse. The Hessian hills and valleys in the south are part of the Grand-duchy, the capital of which is Darmstadt, The rest form the Prussian province of the same name. Hesse

[1] *Eng.* Ore Mountains.

is a wooded land drained south to the Main, west to the Lahn, and north to the Fulda, one of the head streams of the Weser. The routes across it are easier than those across Thuringia, and converge on the growing town of Cassel, on the Fulda. This river unites with the Werra from Thuringia to form the Weser, which breaks through the north-west end of the Highlands to the plain at Minden, forming the Westphalian Gate.

North Germany. Notice in Fig. 35 the rivers Weser and Elbe flowing to the North Sea, and the converging lines of their lower valleys. To the ports at the head of their estuaries, Bremen on the Weser, and Hamburg on the Elbe, are brought the raw material and grain for the industrial centres of the interior, to be distributed up stream, and the agricultural and manufactured products, and the timber which come down stream. The next important line of towns is where the northern and southern routes given by these rivers are crossed by the great routes running east and west. Thus Hanover is the point where the eastern route to Berlin crosses the southern route from Bremen to Cassel for the Hessian and Thuringian lines. Magdeburg and Halle are points where it crosses the routes from Hamburg to Leipzig, the junction for the lines of Thuringia and Saxony. The growth of Atlantic trade has greatly enhanced the prosperity of the North Sea ports. They were formerly less important than the Baltic ports, Lübeck, Stettin, on the Oder estuary, opening to the Stettiner Haff and Danzig at the mouth of the Vistula. Other Baltic ports are Königsberg, at the mouth of the Pregel, opening to the Frisches Haff, and Memel on the Memel or Niemen, opening to the Kurisches Haff.

The Oder and Vistula routes inland converge on the Moravian Gate, beyond which the route is continued by the March tributary of the Danube. From Berlin three eastern routes are important. The most northern crosses the Oder at Küstrin, and the Vistula at Thorn; the second, farther south, crosses the Oder at Frankfurt-on-the-Oder, and runs by Posen to Warsaw, the capital of Poland, on the Vistula, for the

Russian lines; the third follows the Oder through Breslau and reaches the Vistula at Cracow (see Fig. 23).

The Oder-Vistula region is agricultural, growing rye, flax, and potatoes, and breeding horses and cattle. The introduction of the sugar-beet, and sugar refining, of which Frankfurt-on-the-Oder is the centre, has contributed much to its prosperity. Coal is found on the Silesian coalfield, which lies in Germany, Austria, and Russian Poland, the centre of which is Königshütte. Woollen manufactures are important round the margin of the highlands, as at Leignitz, and at Lodz in Poland, the latter one of the great cotton towns of the world and one of the most populous cities in Russia.

The morainic heights along the Baltic are of little economic importance. The different regions are isolated by difficulties of communication across an infertile and often marshy region, covered with small morainic lakes. Schleswig-Holstein, Mecklenburg, Pomerania, and West and East Prussia, the latter famous for its horses, are all thinly peopled, except along the great valleys. The Prussian power, which has expanded so remarkably in the last two centuries, had its beginnings in the Mark of Brandenburg. The capital is Berlin, on the Spree, a sub-tributary of the Elbe, connected with the Oder by canal. The importance of Berlin sprang from its command of routes, and from the geographical causes which led to the expansion of Prussia.

Historical Summary. It is impossible to give even an outline of the history of this vast and geographically varied region. The Roman power in Germany was based on the Rhine. As the Empire weakened, many German tribes, Goths, Burgundians, Vandals, Franks, and others, established themselves within the Empire, which asserted a nominal authority over them. In A. D. 800 the great Frankish warrior, Karl, or Charlemagne, was crowned Emperor of a domain which included France, Germany, and Switzerland, and extended into Spain, Italy, and Hungary. So vast an empire could not long, with the means of communication of

that day, be held together. The next thousand years witnessed a struggle between political and geographical conditions. The political adjustments proved permanent only in so far as they did not clash with geographical tendencies. The nominal authority of an elected emperor survived till the beginning of last century, but most of his feudal vassals, whether lords of a vast territory or of a single town, were virtually independent. The number of these, many of which survive to-day within the reconstituted German Empire, show the extreme geographical complexity of this part of Central Europe.

The last two centuries have seen the rise of Prussia, now the predominant State in the German Empire. For centuries the lands round the Vistula, which lay outside the Empire, were alternately under Teutonic and Polish control. In 1618 Brandenburg was united with the Prussian duchy, both acknowledging the feudal superiority of Poland. This was remitted by Poland in the middle of the seventeenth century. Prussia then expanded rapidly over the routes leading from Berlin, and at one time included Warsaw, which is now Russian. After the war of 1866, in which many German States sided with Austria, Prussia annexed Hesse-Cassel, Hesse-Nassau, Hesse-Homburg, Frankfurt, Schleswig-Holstein, and Lauenburg. The war with France in 1871 gave Prussia no new territory (Alsace-Lorraine becoming an Imperial land), but an enormous increase of prestige. The King of Prussia assumed the title of German Emperor. The German Empire consists of the kingdoms of Prussia, Bavaria, Saxony, and Württemberg, the Grand-duchies of Baden, Hesse, Mecklenburg-Schwerin and Mecklenburg-Strelitz, Saxe-Weimar and Oldenburg, four duchies, seven principalities, the free towns of Lübeck, Bremen, and Hamburg, and the Imperial land of Alsace-Lorraine.

DENMARK.

Denmark consists of the peninsula of Jutland, and of the low islands (Zealand, Fyen, &c.) between it and Scandinavia.

Jutland is noticeable among the peninsulas of the world for running north. Structurally it is a continuation of the low North German Plain. The highest point, where the Baltic Heights end, is only 560 feet high. The western coast is bordered by sand-ridges and lagoons, but the east coast has several good harbours. The climate resembles that of eastern England. The soil is not very fertile, and oats, barley, and root crops are more important than wheat. As in the other parts of the Baltic Heights (see pp. 83, 111), large areas consist of moor or bog, but much has been done in recent years towards their reclamation. A great development of scientific dairy-farming has brought prosperity to a country not naturally rich.

The chief town is Köpenhagen, on Zealand, commanding the passage through the Sound into the Baltic. Tolls were formerly taken of shipping, but since the opening of the new route between the Elbe and the Baltic by the Kiel Canal, Köpenhagen has been a free port. Railways and steam ferries, which carry the trains across the straits, connect Köpenhagen by Gjedser with Warnemünde or by Körsör with Kiel and with Esbjerg. The latter is on the west coast of Jutland, and is a packet-station for England.

THE BRITISH ISLES.

The British Isles rise above the continental shelf of Europe, which ends 100 miles west of Ireland. Great Britain, the largest island, divided politically into England, Wales, and Scotland, is separated from France by the English Channel, 20 miles broad between Dover and Calais, but 100 miles broad between Land's End and Britanny. The North Sea separates it from Central Europe and Scandinavia, 400 miles broad between the Wash and Denmark, 300 miles between Buchan Ness and Norway, and 200 miles between the Shetlands and Norway.

Ireland, the second largest island, is separated from Great Britain by the Irish Sea, 130 miles broad in the centre, but narrowing to the North Channel in the north and the St.

George's Channel in the south. Both lead to the Atlantic, which washes the west of Scotland, Ireland, and Southern England.

Highlands and Lowlands. The south-east of England is a scarpland. The highlands of Devon and Cornwall and Wales jut out to the west, separated by the Bristol Channel. A broad mass of uplands crosses Great Britain from sea to sea, running north-east from the North Channel. These are the Southern Uplands of Scotland, from which the Pennines run south into England. The Pennines are flanked east and west by lowlands, except where the Cumbrian Mountains project westward to the Irish Sea. The rest of England is a plain, crossed by heights running south-west to north-east. The Scottish Lowlands, north of the Southern Uplands, are also crossed by heights running in the same direction. Still farther north are the Scottish Highlands, divided by the rift of Glenmore, the Great Glen. Notice that it, too, runs south-west to north-east, the direction of most of the feature-lines of the island. The west coast is fringed by the Inner and Outer Hebrides, separated by the Minch. The Orkneys and Shetlands in the north stretch towards Norway.

Ireland has highlands in the north and south, separated by a central lowland running from sea to sea.

Great Britain, therefore, like France, has lowlands opening to three seas, the Channel, the North Sea, and the Atlantic. In both, communication with the Atlantic is relatively difficult. In Great Britain, with the exception of the Severn, Dee, Mersey, and Clyde, the western valleys lead to rugged highlands, which bar the way to the lowlands beyond. In the east the long slope gives many rivers an eastward course, and their value as routes is increased by the long navigable estuaries running far inland. Great Britain is thus a North Sea country, and is closely connected physically and historically with the neighbouring continent, of which it once formed part. In the south, where Southampton Water faces the Seine estuary, and Calais cliffs are visible from Dover, the French or Latin

influence is strongest. In the east, where the Thames, Colne, Wash, and Humber estuaries open opposite to those of the Schelde, Rhine, Weser, and Elbe, the Teutonic or Central European influence predominates. The Scandinavian influence is strongest where the northern seas are narrowest, in the

FIG. 36. The Highlands and Lowlands of Britain. Cf. Fig. 37.

Shetlands, Orkneys, and Northern Scotland. In Ireland the lowlands also open east towards Great Britain. This has been the determining influence in Irish history (see p. 147). The Atlantic approaches are much less easy, and to the west there

is no land nearer than the New World. The southern valleys, with good harbours, open towards the Northern coast of Spain, over 600 miles distant. The commercial relations with Spain were important until the English supremacy was firmly established.

The highlands of the British Isles are pastoral. The low-

FIG. 37. The Older and Younger Rocks of Britain. Over the black areas rocks of carboniferous age or older appear at the surface, over the white areas these older rocks are covered by rocks of a more recent age.

lands, except in the west, where they are too wet, are agricultural. On the coasts fisheries are important. Mining has developed round the margin of the highlands, and great industrial regions have grown up where the mineral wealth includes coal. Compare these conditions with those of France.

Climate. Climatically Britain is a link between Central

and Northern Europe. In Southern England the climate resembles that of Northern France and in Northern Scotland that of Western Scandinavia. In the latter the increase in the length of the summer day and the winter night is very marked. These increase northwards till, near the pole, summer is a six months' day and winter a six months' night. In Northern Scotland the Sun sinks for a few hours below the horizon at midsummer, but it is light enough at midnight to read. In

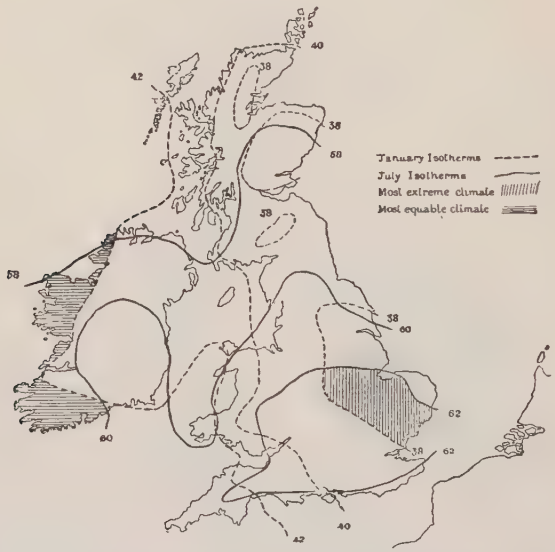


FIG. 38. Winter and Summer temperatures. Notice that the January isotherms run north and south, those for July roughly east and west, bending northwards over the land. Hence the range of temperature is greatest between the Wash and the Thames, and least in the West of Ireland.

winter there is little sunshine, and night lasts for nearly eighteen hours. The summer temperature falls from south to north, and the winters of the lofty Scottish Highlands are naturally extremely severe. On the plains the lowest winter temperatures are found in the east, so that the south-eastern region is that which has the greatest range of temperature (cf. Fig. 38).

The British Isles lie in the track of the south-west winds, which bring rain at all seasons, but most in winter. This rain falls most abundantly on the western Highlands. Ireland has a higher average rainfall than Great Britain, and the west of Great Britain than the east. These winds (see *Jun. Geog.*, pp. 21–32) also render the climate equable, making the summers cooler and the winters warmer than in corresponding latitudes in the interior of Europe. For the same reason the west has a more equable climate than the east.

Some diversity of occupations corresponds to difference in rainfall. The west is pastoral, with cattle in the lowlands, and sheep in the highlands, though the Vale of Hereford, in the lee of the Welsh Mountains, is agricultural. The drier east is agricultural.

The products of Britain also mark a transition from Central to Northern Europe. Agriculture can hardly be carried on above 1,000 feet above sea-level. In the Scottish Lowlands, north of which there is little agriculture, the hardier cereals (barley, oats) are grown. Wheat is almost confined to the agricultural lowlands of Eastern England. In Southern England apple-orchards and hop-gardens recall Northern France. The vine and apricot ripen, but are near their northern limit. In Scotland the excellence of the strawberry and other small fruits indicates an approach to sub-arctic conditions.

GREAT BRITAIN.

Devon and Cornwall. This hilly peninsula consists of hard old red sandstones and granites. The former form high belts south and north of the plain of Devon, culminating in Exmoor (1,700 feet). Granite forms the high *tors* of Dartmoor (2,000 feet), and Bodmin Moor. The Exe and Tamar rise in the extreme north, and flow south. The Taw, from Dartmoor, flows north. The bleak highlands pasture sheep, cattle, and half-wild ponies. The valleys are fertile. Those opening south, with a mild and rainy climate, produce early vegetables

and flowers. The dairy industries are famous. The lower ends of the valleys have been drowned, forming estuaries, which are often converted by sand bars into transverse lagoons. The trawl fishery centres at Brixham, on Tor Bay. Penzance and St. Ives are Cornish fishing centres.

Mining is a declining industry. The tin and copper mines were visited by Phoenician, Greek, and Roman traders, but the former are now nearly exhausted. Copper is mined and sent to Swansea for smelting. Cornish miners emigrate to all the mining lands of the world.

The highlands of Devon and Cornwall were the refuge of the conquered Britons, pushed west by the Saxons. With much barren interior and excellent harbours the inhabitants became fishers and sailors, like their opposite neighbours and kinsmen, the Bretons (see p. 95). 'Devon sea-dogs' sailed from the ports of North Devon (Bideford), South Devon (Plymouth, &c.), to wrest the New World from Spain and found a colonial empire. The finest of many good harbours is Plymouth Sound, where Plymouth, Devonport, and Stonehouse are built. Exeter, at the head of the Exe estuary, controls the routes between east and west. An ancient cathedral shows its importance as the capital of the West Country.

Immediately to the east is the plain of Somerset, drained by the Parret, and flanked by the older Quantock and Mendip Hills, and by the western end of the chalk and limestone heights of South-east England in the south-east. The Vale of Taunton unites it to the Exe valley. The routes to the north go round the ends of the Mendips, converging on Bristol.

Southern England. In Southern England the feature-lines run east and west. Layers of chalk, sandstone, clay, and limestone are bent into a series of wave-like upfolds and downfolds. Where they are bent downwards, younger rocks appear on the surface. On the upfolds the younger layers have been worn away by the action of wind and water, exposing the older rocks. The result is a series of chalk, sandstone, or

limestone ridges, separated by clay plains (cf. Figs. 39 and 40). Trace on a map the following arrangement of up- and down-folds. (1) The White Horse and Chiltern Hills (Chalk. Up). (2) The vales of Pewsey and the lower Thames (Gravels and

FIG. 39. The Rocks of South-eastern England and their continuation into France (*after* Topley). Compare this carefully with Fig. 40 which shows a section from north to south across this region.

Clay. Down). (3) The Hampshire Downs (Chalk) in the centre, running west as the Salisbury and Western Downs (Chalk), separated by the vales of Wilton and Blackmoor, and east as the

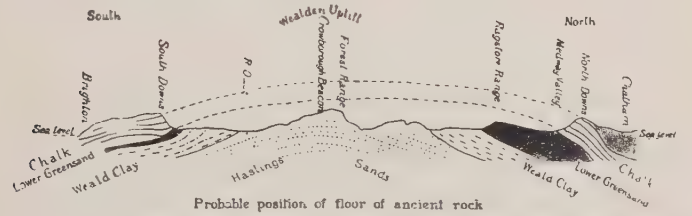


FIG. 40. Section from the Channel to the Thames across the Wealden region. Cf. Fig. 39.

North and South Downs (Chalk), separated by the vales of Kent and Sussex, broken by the sandstone Ragstone Heights and Ashdown Forest (all up but the top worn away). (4) The plains of Dorset and Hampshire (Gravels and Clay), and the

straits of the Solent and the Spithead. (5) The Downs of Purbeck and the Isle of Wight (Limestone and Chalk. Up). (Cf. Fig. 41.)

The chalk and limestone heights are sheep pastures. The clay plains and the sandstone ridges are cultivated. In the east are orchards and hop-fields, with market-gardens near the towns. Ashdown Forest, between the vales of Kent and Sussex, is a remnant of the forest of the Weald, which long prevented communication except along the treeless chalk.

The natural route from the Channel to the interior is by Southampton Water, the estuary of the Itchen, entered either from the Solent or Spithead. The tides come up the Spithead later than up the Solent, causing four daily tides at South-

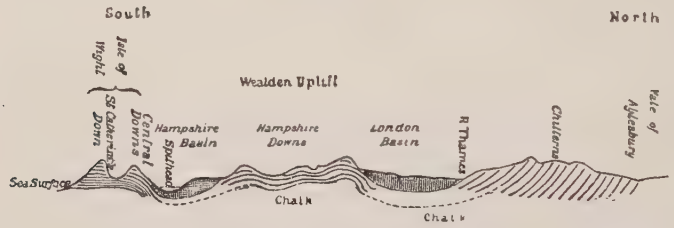


FIG. 41. Section from the Channel to nearly the centre of the English Plain. Cf. Fig. 40.

ampton, which is therefore peculiarly accessible to shipping. Two roads lead north from it by gaps in the chalk, one by Salisbury, the other by Winchester, both cathedral cities. Near the former is the stone circle of Stonehenge, probably the oldest human monument in our islands. The latter, on the Itchen, was the capital of the West Saxons, who entered Britain by Southampton Water. Later it became the capital of England, and remained so as long as Southampton was the principal route to the interior. Southampton has still a vast commerce. It is a packet-station for France, and the starting-point of many ocean routes. Portsmouth, farther east, has become the chief naval station, because its excellent harbour is easy of defence. The entrance is commanded by

Portsdown Hill behind, and the heights of the Isle of Wight in front, both strongly fortified.

The Thames estuary on the east coast is the best natural route to the interior from the North Sea. London, like Southampton, is very accessible to shipping. Two tides, one by the North Sea, and one by the Strait of Dover, reinforce each other, causing exceptionally strong and high tides at London Bridge. Two contiguous cities grew up, one round London Bridge, the other round Westminster ford, each with its great church. As accessible as Southampton by sea, London is infinitely better situated with regard to the interior. It is in the centre of the scarplands, while Southampton is on their margin. In this respect it may be compared with Paris.

A third port of early and enduring importance is Dover, at the end of the North Downs, where the Channel is narrowest. The Kentish ports were used by the Jutes and South Saxons, the latter having left their name in Sussex. The obstructions of the Weald and Romney Marsh prevented them from expanding into the lower Thames, which was occupied by the Middle Saxons (Middlesex).

The other coast towns of South-eastern England are (1) fishing towns, small ports, and seaside resorts, the latter growing with the growth of London (Margate, Ramsgate, Hastings, Eastbourne, Brighton, Bournemouth), or (2) packet-stations (Folkestone, Newhaven, Weymouth, &c.). Thus the French and English margins of the Channel have similar economic interests, and a similar grouping of population. Inland is a second series of towns, built at gaps in the chalk heights. Lewes, in the Ouse gap, and Arundel, in the Arun gap, are important in the South Downs. Commanding the gaps in the North Downs are Canterbury on the Stour, Maidstone and Rochester-Chatham on the Medway, and Guildford on the Wey. Like the corresponding French inland towns, some have fine churches and cathedrals.

The distribution of villages in this region is instructive, and is well seen by comparing an ordnance with a geological map.

They are built where water comes to the surface above the impervious clay, after filtering through the porous chalk or limestone.

The Scarps north of the Kennet-Thames. These form parallel belts of chalk (White Horse, Chilterns, East Anglian Heights), or limestone or marl heights (Cotswolds, Edgehill, Northampton Heights), separated by clay plains, which are broken by minor sandstone or limestone heights. The gaps through them are followed by old roads and modern railways. Reading is built at the end of the Thames Gap through the chalk, and Oxford at the end of the Evenlode and Cherwell gaps through the limestone. The lower parts of the clay plains, which are often flooded, are in grass for

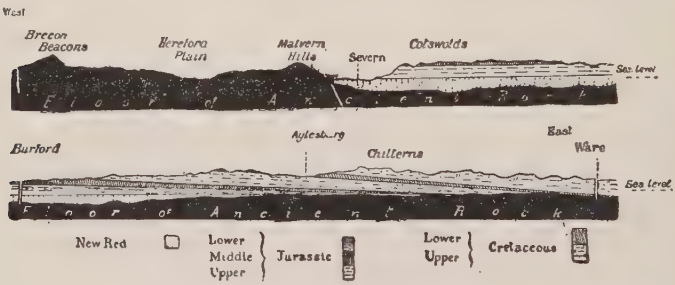


FIG. 42. Section across the Welsh Mountains and the Scarplands north of the Thames.

dairy cattle. Above the flood-level they are agricultural. The hills are cultivated where the soil is deep enough, and elsewhere grazed by sheep. This region is on the southern margin of an area which was covered at a remote period known as the Ice Age, or Glacial Epoch, by an ice-sheet which extended over the lands and filled the seas of Northern Europe. Over this area much of the surface soil is boulder clay, composed of rock-waste ground fine by the friction of the ice as it moved slowly on. As the ice-sheet was thick enough to cover hills as well as plains, the boulder clay does so too, forming a stiff soil in which wheat can be grown (see p. 68).

West of the Evenlode, the Cotswolds are a pastoral region,

with woollen manufactures at Stroud and elsewhere. The capital is Bristol, on the tidal Avon, opening to the estuary of the Severn, which is to the western scarplands what the Thames estuary is to the eastern. The routes from the lower Thames go north or south of the White Horse Downs to the Avon, and thence by Bath to Bristol. Another set of routes leads round the ends of the Mendips into Somerset. The route from Bristol to the Midlands and the north follows the Severn to Gloucester, where the river is bridged at the head of tidal navigation, and either follows the Severn north or the Avon east through the fertile Vale of Evesham. With this control of routes inland Bristol early became an important port. Some of its manufactures, e.g. cacao and tobacco, depend on its imports of produce from hotter lands—but tanning, boots and shoes, and paper are the most important.

East Anglia. Much of this region was settled by the East Saxons and Angles, whose name is preserved in Essex and East Anglia (Norfolk and Suffolk). Coming oversea, they sailed up the many estuaries north of the Thames (Colne, Stour, Yare). This region was isolated by the Chilterns and the Lea marshes in the south, and by the Fens in the north, and a distinctive individuality resulted which has made East Anglians pioneers in religious and political movements. The early development of manufactures round Norwich was due to various causes, including ease of communication by sea with the manufacturing centres of the opposite coast. There are ports and fishing centres on the coast or at the head of estuaries (Norwich, Yarmouth, Harwich, Ipswich, Colchester).

The Fens. The Fens, which border the Wash, are crossed by the lower courses of the Great Ouse, Nen, Welland, and Witham, and form a low-lying marshy region, resembling Holland. The rivers have been canalized and the marshes are drained by ditches called dykes. The towns are (1) on the Fen margin (Cambridge, Bedford, Peterborough), (2) on low heights rising above them (Ely), (3) at the mouths of the rivers (King's Lynn and Boston).

The Midlands. The Midlands are undulating lands of marl or sandstone lying between the Upper Trent, the Severn, and the Warwick Avon. Older harder rocks rise in Charnwood Forest, Cannock Chase, and the Lickey and Clent Hills. The Midlands are a well-wooded pastoral region. Coal is found on the margin of the highlands, on the coalfields of North Staffordshire, Warwickshire, South Staffordshire, and Leicestershire. On the first the towns of the Potteries (Stoke-on-Trent, Hanley, Burslem, &c.) manufacture china and earthenware, the clay being brought from Cornwall by sea and canal. On the eastern margin is Burton-on-Trent, whose breweries owe their excellence to the quality of the local water. The Warwickshire coalfield has long been associated with the iron manufacture. Leland, in the sixteenth century, called Birmingham 'the abode of smiths and cutlers'. In the Civil War of the next century it supplied the Parliamentary army with swords. The Black Country towns (Birmingham, Walsall, West Bromwich, Wolverhampton, Dudley, &c.), manufacture iron in forms too numerous to mention. On the margin of this region Coventry manufactures cycles. On the Leicestershire coalfield, leather, abundant in a pastoral region, is made into boots (Northampton). Hosiery, boots, tobacco, and lace are also manufactured (Leicester).

This region was included in Mercia. The Angles reached it by the Wash and its rivers, or by the Humber and Trent. Forests and marshes led to the growth of many small centres and prevented the consolidation of Mercia. One of the chief route centres is Rugby. The south route reaches the Thames at Oxford by the Cherwell valley. The north route follows the Soar to Leicester, whence routes go to Nottingham, the lower Trent, and Derby for the Pennine towns. Routes to the west go by the Severn and Shrewsbury, and by the Staffordshire or Midland Gate, between the Pennines and the Welsh Highlands, to the plains of Cheshire and Lancashire.

The Welsh Highlands and their Margin. Old hard rocks cover most of the region west of the Severn and Dee,

forming the Welsh highlands. The valleys of the Towy, Teify, Upper Severn, and Dee strike south-west and north-east. The plain of Anglesey is separated by the Menai Strait from the Snowdon Mass (3,560 feet). This, like the Berwyn Mountains between the Severn and Dee, the Mynydd Bach, the Clun and Radnor Forests, and the South Shropshire Hills, is drawn out in the same direction. The last four are drained by the Teme, Wye, and Usk to the Severn or its estuary. The Wye at first runs south-east, and crosses the broad plain of Hereford, planted with orchards and hop-gardens. This lies between the Welsh Highlands on the west, the South Shropshire Hills on the north, the Malvern Hills on the east, and the Forest of Dean, famous for ironworks since Roman days, on the south. Across the latter the Wye cuts a gorge to the sea. From this plain many routes lead east to the Severn. They are commanded by Leominster, in the north, Hereford in the centre, and Monmouth in the south.

The feature lines in South Wales run west-east, e.g. the Pembroke and Gower peninsulas, the Brecon Beacons, the Gwent lowlands. The Usk, Taff, Tawe, and other rivers drain the slopes of the Brecon Beacons, across the Highlands of Glamorgan and West Monmouth rich in coal (Merthyr Tydfil, Aberdare). They flow through the fertile Gwent[1] lowlands bordering the Bristol Channel, where great ports have grown at their mouths. Newport on Usk (Mon.), Cardiff, Barry, and Port Talbot export smokeless coal, and Swansea anthracite. Swansea has great smelting works, and Llanelly is the centre of the tinplate industry.

Wales is easy of entrance along the coast, both in the north and south. Edward I took the north coastal route. The Irish Mail passes by it through Conway to Holyhead. To overawe Wales three March or Border Earldoms were created—(1) Chester, with the fortress of Chester, commanding the northern coast route, as well as that by the Dee valley ; (2) Shropshire, with the fortress of Shrewsbury controlling the

[1] See Survey Atlas of England and Wales, Plate I.

Severn route, and (3) Hereford, commanding the Wye route. The route by the Vale of Glamorgan was controlled by the fortress of Cardiff. It could be reached by crossing the Severn near the mouth of the Usk or at Gloucester, the lowest point where the Severn was bridged. Gloucester played an important part in the War of the Roses, when Wales was Lancastrian, and in the Civil War, when it was Royalist. The low part of Pembrokeshire, where Pembroke has now an arsenal and dockyard, was called 'a little England below Wales', owing to its non-Keltic people and speech.

The Cheshire and Lancashire Plains. These are rich meadow lands drained by the Dee, Weaver, and Mersey, with Chester, Manchester, and Liverpool as the chief centres. The routes from the south and south-east have already been described. There is an easy but narrow route north between Rossendale and Bowman Forests and the sea to Lancaster, through Preston, at the head of the Ribble estuary.

Liverpool, Preston, and Manchester, though physically of the plain, are economically bound up with the great cotton and iron industries which have developed on the coalfields along the western margin of the Southern Pennines. Through Liverpool and Manchester, the latter made a port by the cutting of a Ship Canal, Lancashire obtains raw material for its cotton industry, which owes much to the damp climate. Preston is an important manufacturing and route town, and is a port.

The Southern Pennines and their Margin. These lie between the Trent and the Aire, where the Aire Gap, leading to the Ribble valley, divides the Pennines into two parts and forms the main route across them. The Southern Pennines are an upfolded area, with older sandstones and limestones in the centre, and younger rocks, including coal, on the flanks. Where the sandstones are laid down horizontally, as in the Peak, they weather into tables; where inclined, as east of the Derwent, into scarped ridges. The limestones form picturesque scenery of the karst type. The centres of the latter region are Buxton and Matlock, both with mineral springs.

The Southern Pennines are drained west to the Irish Sea by the Mersey and Ribble, and east to the Ouse by the Don, Calder, and Aire, flowing in steep, narrow dales. This is a bleak, thinly peopled pastoral region, from which valleys rich in coal open east, west, and south. Here a dense population is engaged in industry.

The coal-measures of South Lancashire and Cheshire support the vast cotton, engineering, chemical, and other industries, which have concentrated into Blackburn, Bolton, Burnley, Bury, Manchester, Oldham, Rochdale, St. Helens, Stockport, Staleybridge, Warrington, and Wigan, a population exceeded only by that of London. Industrial South Lancashire is really one great town, covered with pit-shafts and mill-chimneys, and served by the great rival ports of Liverpool and Manchester.

The South Staffordshire coalfield has already been mentioned. On the eastern flanks of the Southern Pennines is the York-Derby-Nottingham coalfield.

The Vales of Trent and York and the Eastern Scarps. East of the Pennines the lowlands are wider, and the routes to the north easier. The lowlands do not reach the sea, which is bordered by two lines of heights, (1) Lincoln Edge and the York Moors (Limestone), and (2) the Lincoln and York Wolds (Chalk). The line of the Aire is continued by the Humber, to which flow the Trent, from the Vale of Nottingham, and the Ouse, which gathers up the Pennine rivers, Swale, Ure, Nidd, Wharfe, Aire, Calder, and Don. The only left bank tributary of the Ouse is the Derwent, from the Vale of Pickering, between the Moors and the Wolds. This region has been heavily glaciated. The Derwent originally flowed to the North Sea, but was dammed back by moraines and diverted to the Ouse. Great moraines cross the Vale of York, determining the position of York.

The position of the county boundary is instructive. It lies far west of the divide, showing that settlement and organization have proceeded from the east, by the Humber and Ouse.

The Humber is obviously a natural route into the interior. It was followed both by Angles and Danes. The former either diverged south by the Trent into Mercia, or pressed north by the Ouse valleys, which formed the kingdom of Deira. Deira was later united with Bernicia, the coastal region north of the Tees, to form Northumbria. Danish blood and influence were less permanent, but are still traceable on the Yorkshire coast.

That York is the natural centre is shown by its importance during the Roman occupation as well as by its becoming the ecclesiastical capital of Northern England. It controls routes (1) by the Trent, through Newark and Gainsborough, across the Vale of Nottingham, with a branch to Lincoln in the Witham Gap, (2) west by the Ouse tributaries, and the towns built where they leave the highlands (Sheffield, Huddersfield, Leeds, Harrogate, Ripon, Richmond), and (3) north by the Northallerton Gate, where the invading Scots were turned back at the battle of the Standard. The numerous battle-fields in Yorkshire show how often these routes have been contested. The eastern vales are thinly peopled, and towns are few. The Humber ports are Goole, Hull, and Grimsby; the North Sea ports Scarborough and Whitby.

The agricultural Vale of York becomes industrial along the Pennine margin. The combination of wool and water-power led to the rise of the woollen manufacture in the Yorkshire valleys, as in the Ardennes or the Cotswolds. This is now concentrated round the Aire and Calder (Leeds, Bradford Huddersfield, Wakefield), where coal is abundant. In the Don valley the iron and steel industry has assumed gigantic proportions at Sheffield, where the millstone grit of the Pennines makes excellent grindstones. It is of long standing, for Chaucer mentions a 'Sheffield whittle'. The manufactures of the Trent or Nottingham-Derby coalfield include lace and hosiery.

The Northern Pennines. These are drained east to the North Sea by the Ouse tributaries and the parallel Tees,

Wear, and Tyne, the latter rising far to the west, and opening a route by the Tyne Gap, comparable in importance to that by the Aire Gap farther south. The Tyne Gap separates the Pennines from the Cheviots, which connect them with the Scottish Uplands. Hexham, which commands this east and west route, as well as routes north by the Cheviot tributaries of

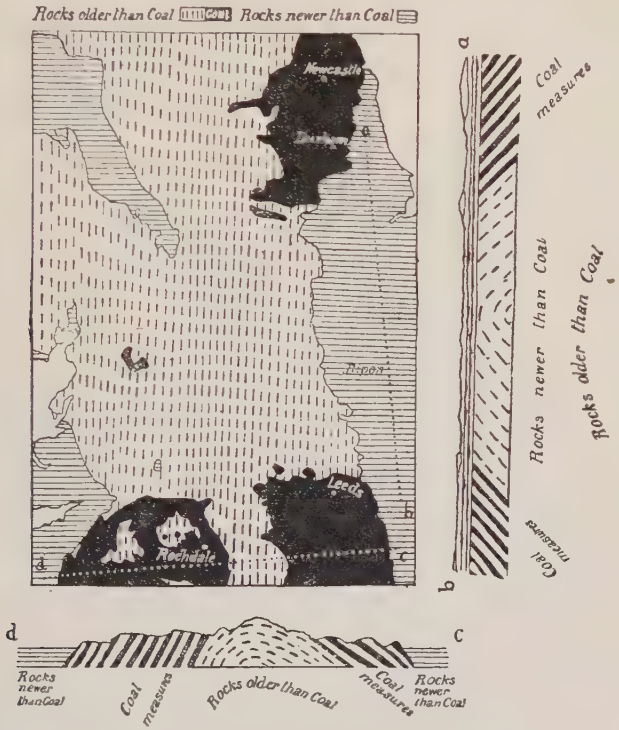


FIG. 43. Plan and Sections showing the Rocks of the Central and Northern Pennines. Notice how the basins with coal-measures are determined by bendings of the strata. N.B. The inclination of the beds is exaggerated in the sections.

the Tyne, has seen much fighting. The North-eastern route from York goes by Darlington on the Tees, Durham on the Wear, and Newcastle on the Tyne, keeping near the base of the mountains. A second series of towns, all ports, are built where these rivers reach the sea. Stockton and Middlesbrough,

the ports of the Tees, Hartlepool a little to the north, Sunderland on the Wear, Newcastle, Tynemouth, South Shields on the Tyne, are all engaged in iron industries, shipbuilding and exporting coal.

West of the Pennines is a great fracture or fault. The Pennines fall steeply to the Eden valley, beyond which rise the lofty Cumbrian Mountains (3,200 feet). From the main axis of these, which runs east and west, radiate glaciated valleys, their upper ends filled by long narrow lakes of the Swiss type. In this pastoral region boots and woollens are manufactured round Kendal. Between the Cumbrian and Pennine Mountains the Shap depression sinks to 1,000 feet, forming a difficult route from the Lune and Ribble valleys to the Eden valley and the lowlands round the Solway. Of these lowlands Carlisle is the centre, commanding all the routes between north and south.

Coal is found on both the eastern and western sides. The Northumberland-Durham field, with its great engineering industries and large export coal trade is the more important. Middlesbrough-on-Tees, which smelts and manufactures iron from the Cleveland Hills of North Yorkshire, has grown with extraordinary rapidity into one of the great industrial centres of the north. On the western margin Barrow-in-Furness is another Middlesbrough. Coal is also abundant round Workington and Whitehaven.

The Southern Uplands. The Southern Uplands stretch from sea to sea, varying in breadth from 50 miles in the centre to 15 miles in the west and 10 miles in the east. They consist of old, hard rocks, cut by river valleys into rounded masses of fairly uniform height (Merrick, 2,765 feet, Broadlaw, 2,750 feet). The surface is treeless moorland or poor pasture, but the lower valleys are wooded.

From the main mass, which runs from south-west to north-east, the Cheviots project east into England, the Border running for 40 miles along the divide. They are flanked east and south-west by lowlands.

The lowland south-west of the Cheviots lies on both sides of Solway Firth. On the other sides it is shut in by the Cumbrian and Pennine Mountains, the Cheviots, and the Southern Uplands. The routes converge on Carlisle, south of the Solway, and Dumfries, to the north. That from England follows the Eden to Carlisle, whence routes diverge north-east to the Tweed, by the Esk and Teviot; or north to the Clyde, by the Annan, Nith, or Dee. The main railway route to the Clyde follows the Annan, crosses Beattock summit (1,000 feet), and descends to Clydesdale, the routes to Edinburgh and Glasgow diverging at Carstairs. Another line reaches Glasgow by Dumfries, the Nith, and Kilmarnock. A route also follows the southern margin of the upland and the head of the estuaries to Stranraer, for Ireland.

The difficulty of the routes has not prevented a fairly close connexion between north and south. The valleys of the Eden, Nith and Clyde, form a well-marked line between south-east and north-west, continued north of the Clyde estuary by the Leven, leading to Loch Lomond. On this line was based the ancient kingdom of Strathclyde, the capital of which was neither Carlisle nor Dumfries, but Dumbarton, where the Leven reaches the Clyde. Such coherence as Strathclyde possessed, it owed partly to the difficulty of access by any other route. The absence of important battlefields round the Solway lowland points to the same fact, showing that neither England nor Scotland was here specially vulnerable, as the Solway Moss blocked the route.

The contrast presented in this respect by the eastern Cheviot or Tweed lowland is shown by the many castles and battlefields round its margin. Its nucleus is the broad wedge of lowland driven by the lower Tweed valley far into the interior of the uplands, and known below the confluence of the Leader as the Merse. This is continued to the south between the Cheviots and the sea by the lowland of Northumbria, crossed by the Aln, Coquet, and other Cheviot streams.

Nowhere less than 10 miles wide, it forms the eastern gateway of Scotland, through which one of the great railway routes from the south (East Coast) approaches Edinburgh. North of the Merse the Lammermuirs reach the sea at St. Abb's Head, near which an easy pass leads to the lowlands of the Lothians. This route is commanded by Berwick in the south and Dunbar at the northern end. The latter was the obvious point to attack invaders (Edward I, Cromwell). A second and parallel route goes by the Till to the Tweed at Coldstream. Halidon Hill and Flodden were fought to secure it. A third route, by the Rede tributary of the Tyne to the Teviot, was the scene of Otterburn or Chevy Chase.

These three routes lead from the Tyne to the Tweed, and belong to the Cheviots. The route across the main mass of the Southern Uplands, following their direction from south-west to north-east, goes from Carlisle by the Esk and Teviot to the Tweed at Kelso. As a route between east and west, this ranks next to those by the Aire and Tyne Gaps. The Waverley route to Edinburgh runs parallel to it by the Liddle to Hawick, on the Teviot, reaches the Tweed at Melrose, climbs the Gala, and descends the Esk to Edinburgh, the centre of the Lothians, and the capital of Scotland.

The Southern Uplands are a thinly-peopled pastoral region, with fertile agricultural valleys, originally cultivated by the monks of the many abbeys (Lincluden and Sweethearts in the Solway lowland; Melrose, Dryburgh, Kelso, Jedburgh in the Tweed). The woollen manufacture developed in the valleys round Dumfries in the south, and Hawick, Galashiels, Selkirk, and other small centres in the east.

The breadth of the Southern Uplands, and their scanty population, explains the division of Great Britain into two independent kingdoms. Lancashire was not, till a century ago, a populous region, and hundreds of miles of wild, almost uninhabited, country separated the settled lowlands of England and Scotland. Raids were common, but friendly intercourse developed late. Scotland, with a much poorer country and

routes downhill, was early the aggressor. At the beginning of the second century A. D. Hadrian's Wall was built from the Tyne to the Solway, to keep out marauding hill tribes. Later the difficulties of communication favoured, as in Thuringia (see p. 110), the independence of many feudal barons on both sides of the Border, where constant unrest prevailed, especially in the east.

The Central Lowlands. The characteristic direction of the Scottish feature-lines is well seen in the Scottish Low-

FIG. 44. The Coal Basins of the Scottish Lowlands. Notice how far this agrees with Fig. 43.

lands, a rift valley 50 miles wide between the South Uplands and the Highlands. Above its floor rise old hard igneous rocks, forming isolated precipitous crags in the castle rocks of Edinburgh, Stirling, and Dumbarton, and traceable as a double line of heights along the northern and southern margins. The southern line is represented by the Lanark Moors and the Pentlands. The northern, which runs parallel to

the southern margin of the Highlands, diverges from them in the east to enclose the vale of Strathmore. It is broken up by rivers flowing to the three estuaries which penetrate the Central Lowlands. The Clyde descends in fine cascades to the east of the Lanark Moors, crosses the broad strath of Clyde, famous for fruit and Clydesdale horses, and opens to the Clyde estuary between the Renfrew and Campsie Hills, with Dumbarton guarding the gap to the north. The Forth flows south-east between the Campsies and the Ochils. Stirling, built in the gap, commands the routes from the north to the Fife lowlands, north of the Forth estuary, and to the Lothians south of it. Bannockburn was fought in the immediate neighbourhood. In the Tay Gap, between the Ochils and the Sidlaws, Perth controls the routes to (1) Strathmore, north of the Sidlaws, (2) the Carse of Gowrie, between the Sidlaws and the Tay estuary, and (3) the route round the head of the estuary to Fife and the Lothians.

The plains are agricultural; the hills are pastoral. Coal is widely distributed. On the Ayr coalfield Kilmarnock manufactures woollens, and Ayr and other ports export coal to Belfast, on the opposite coast of Ireland. The iron industries of the Lanark coalfield centre at Glasgow, the second city of the Empire. It owes its pre-eminence to its position where routes from all directions converge on the Clyde at the lowest point where it can be bridged. Of its many industries, those connected with shipbuilding and engineering are the most important. It is surrounded by a ring of industrial towns, making the Lower Clyde the most populous part of Scotland. Dumbarton, Port-Glasgow, and Greenock are shipbuilding centres. Paisley makes cotton thread. Coatbridge, Airdrie, Motherwell, Bathgate, and Hamilton smelt and manufacture iron. The outlets for this wealthy region are the Clyde ports and railways in the west, and in the east Grangemouth, on the Forth, reached through Falkirk. On the Stirling-Clackmannan coalfield ironworks and chemical manufactures are important at Falkirk, and tartans and carpets are made at Stirling.

The Fife coalfield extends from Stirling to Methil, which is the chief port exporting coal. There are no large industrial centres, but linens are made at Dunfermline, and linoleum at Kirkcaldy. Dundee, the largest manufacturing town of eastern Scotland, lies north of this coalfield. It is the chief seat of the hemp, jute, and coarse linen manufacture, a ship-building centre, and the port from which the whaling fleets sail. Farther north are Arbroath, Montrose, Brechin, and other small manufacturing towns. South of the Forth estuary is the small Midlothian coalfield, with no large centres except Edinburgh, famous for brewing, distilling, and printing. Paper-making is important in the neighbouring villages.

The Scottish Highlands. The rest of Scotland consists of the Highlands and the outlying islands. The trend of the feature-lines from south-west to north-east is marked in Glenmore and the Inner and Outer Hebrides. The glaciated valleys of the west coast are deeply filled by the sea, forming long fiords, fringed by outlying islands. Notice the characteristic direction of Kilbrennan Sound, between Kintyre and Arran, the Sound of Jura, the Firth of Lorne, Loch Linnhe, the Sound of Sleat, between Skye and the mainland, and the Minch. The same direction appears in the glaciated inland valleys, filled with narrow lakes, such as (1) the upper valley of the Tay, with Loch Tay, (2) the depression filled by Lochs Awe and Rannoch and the Tummel, and (3) the line of the Spean, Loch Laggan, and the Spey. North of Glenmore the lakes and valleys converge towards the Moray Firth.

The Highlands are the remnant of a plateau of old, hard, crystalline rock, which weathers slowly, and forms a poor soil. The elevation is between 3,000 and 4,000 feet in the South-west Highlands south of Glenmore, and about 3,000 feet in the North-east Highlands north of it. The characteristic landscape consists of grass or heather moors, above which rise rounded heights, becoming bare and stony towards the summits. The picturesque lake and mountain scenery attracts thousands of tourists annually, but, economically, the High-

lands are a poor country, consisting of sheep-walks and deer-forests. The extension of the latter is further depopulating the Highlands. Fishing is important round the coasts. The towns are either on the coast or at the entrance of important valleys (Dunkeld, Callander, Crieff, on the southern margin, Inverness and Fort William in Glenmore, &c.).

The east is superior to the west both in climate and configuration. The lowlands are more extensive, the softer sandstone weathers into a deeper, more fertile soil, and the climate is drier. The Moray lowland is the most prosperous part of the Highlands, a fact which explains the power of the rulers of Moray in early Scottish history. Between the Moray Firth and Strathmore is the lower land of eastern Aberdeen, a wooded pastoral region with granite quarries, with fishing off the coasts. It forms the route between north and south, and is controlled by Aberdeen, at the mouth of the Dee and Don valleys. Elgin is the largest of the many small towns, mostly on the coast (Peterhead, Fraserburgh, Banff, Nairn), a fact which points to the relative poverty of the interior even in this more prosperous region.

Inverness, built where Glenmore reaches the Moray Firth, is the natural capital of the Highlands, controlling all the routes. The Highlands and the Stuart cause were lost together when the Hanoverians were victorious at Culloden in 1745. From Inverness the coastal route continues by Dingwall to Thurso and Wick, both fishing ports, with steamer communication with Kirkwall in the Orkneys, and Lerwick in the Shetlands. Fishing and sheep-rearing support the scanty population of these islands, where, as in the north-east of the neighbouring mainland, Scandinavian blood predominates.

The routes from north to south across the Highlands are blocked by the highest part of the Highlands, stretching from Ben Nevis (4,440 feet) at the southern end of Glenmore, to Cairngorm (4,300 feet) between the Dee and Spey. From its centre diverge the Dee to the east, the Spey to the north, the Spean to the west and the Tay to the south. Communica-

tion between these valleys is very difficult. The Tay, Spey, and Dee are separated by the high Cairngorm and Lochnagar mountains, with no easy routes across them. All the traffic from Strathmore passes by Dunkeld and the upper Tay and Garry valleys, the latter flowing through the narrow ravine of Killiecrankie, where a victorious army can hold the route. The pass of Drumochter (1,500 feet) leads from the Garry to the Spey, turning the Monadliath mountains between the Spey and Glenmore. South of these an easy pass leads to the Spean and Fort William, at the base of Ben Nevis. Inverness can be reached from the Spey either by Grantown and Forres, or by the difficult route followed by the Highland Railway, which leaves the Spey at Aviemore, and crosses the upper valleys of the Findhorn and Nairn, which flow to the Moray Firth.

The routes to the west are not easier. The most important are from Crieff and Callander, where the Earn and Teith respectively leave the Highlands, to Oban, the latter giving access to Loch Katrine and the Trossachs, immortalized in Scott's *Lady of the Lake*. The easiest routes to the West Highlands from Glasgow are by sea, through the Crinan Canal, which utilizes a depression in the Kintyre peninsula. East of this are the islands of Bute and Arran. The difficult West Highland line, following difficult routes, is carried almost due north from Glasgow to Spean Bridge and Fort William.

The value of Glenmore as a route across the Highlands is lessened by the fact that it unites regions which can never be anything but thinly peopled. The floor is partly filled by Lakes Ness, Oich, and Lochy, now united by the Caledonian Canal. The route is controlled by Fort William in the south, Fort Augustus in the centre, and Fort George (Inverness) in the north, names dating from the days when the Highland clans supported the Stuarts against the Hanoverian dynasty. To facilitate the pacification of the Highlands roads were cut in various directions from these centres.

The Highlands are neither physically nor economically

favourable to unity. Only a very small population can be supported, and this not concentrated into towns, but scattered up and down valleys. Oban, the great tourist centre of the West Highlands, has only about 5,000 inhabitants. These small groups are further isolated from each other by the difficulties of communication, especially in winter, when snow blocks the passes. Hence clan feeling has always been stronger than national, and old faiths and political ideals have been long retained. The Roman Catholic religion prevails in certain districts, and the Highlands long upheld the Stuart claims.

Historical Summary. In Scotland, as in England, the lowlands open east. The west is difficult of access, and thinly peopled. Scottish history is the history of the struggle for the lowlands. The Moray lowlands were a base of attack for the Scandinavians, the Tweed lowlands for the English, the larger, richer Central Lowlands being the objective of both. This struggle was marked by such incidents as the murder near Elgin, of the Lowland king Duncan, by Macbeth, the hereditary lord of Moray, in 1040, or by the invasion of Edward I, who pushed from the Tweed to the Lothians, from the Lothians to Strathmore, and from Strathmore by Aberdeen to the Moray lowland, in the thirteenth century.

The victory fell to neither of these marginal powers, but to the Central Lowlands. In the ninth century the Highlands and Lowlands were united, and Dunkeld, the key of the Tay, became the ecclesiastical capital. The growing power of the Scottish monarchy was based first on Strathmore (Perth, Scone, Dunkeld), then on Fife (Stirling, Dunfermline, St. Andrews), and finally on the Lothians (Edinburgh and Linlithgow). The Scottish boundary reached the Tweed soon after 1000 A. D. David I, in the first half of the twelfth century, consolidated the kingdom by reducing Moray and holding the Border lowlands as fiefs of the English crown. By founding abbeys in all the lowlands he attached an agricultural population to the soil, and secured an organized

resistance to invasion. Henceforward, the English might harry Scotland, but they never succeeded in holding it. The menace from England contributed to the concentration of the Scottish power at Edinburgh, the best strategic point in the country. The invaders could easily be checked at Dunbar; the capital, built round a precipitous crag between the mountains and the sea, could easily be defended; and communication with the continent through Leith was easy. The constant menace of England threw Scotland into the arms of France, enabling the common foe to be simultaneously attacked in flank and rear.

Besides invasion by land Scotland was exposed to attack by sea, especially after Norway secured the Faeroes, Shetlands, Orkneys, Hebrides and Man (see p. 142). A final unsuccessful attack on the mainland at Largs, at the mouth of the Clyde, was repelled in 1263. Three years later the Hebrides were annexed, but the Orkneys and Shetlands remained Norwegian till 1468. In these islands the Scandinavian strain is still very strong.

England, the southern half of Great Britain, was probably settled in prehistoric times from the Continent of Europe, possibly before the formation of the Channel. Historically it was first reached in the south-west by Phoenician traders in search of tin, but no permanent settlement was made. The Roman conquest was made across the Straits of Dover, and pushed by various routes to the furthest extremities of the lowlands. The Roman power outside the lowlands was hardly more than nominal. The Saxon conquest was effected by all the important sea gates of the east and south of England. The influence of the topography on the political divisions of the Heptarchy has already been alluded to. The Danish conquest was similar in character, but less permanent. Finally the Normans, a people of Scandinavian origin with their capital at Rouen, on the Seine, attacked the vulnerable south-east coast, fought a decisive battle near Hastings, secured the Kentish seaports, and moved on London, crossing the

Thames at Wallingford and advancing through the Aylesbury Gap in the Chilterns. The Tower of London was built to secure the Norman control of London Bridge and the routes radiating from it. From this centre the lowlands were conquered and strongly fortified and the northern approaches to Scotland laid waste. For a century and a half the southern lowlands of England were closely connected with the French shores of the Channel, and it was not till the middle of the fifteenth century that the English power was expelled from France. The internal history of England has at all times been affected by the difference in economic interests between the south-eastern lowlands and their highland margins.

THE ISLE OF MAN.

In the middle of the Irish Sea is Man (230 sq. miles), a mountainous island (Snaefell, 2,030 ft.) with picturesque glens opening to the sea. Fishing, lead-mining, sheep and cattle rearing, and a little agriculture are the occupations. Douglas, on the east coast, has an immense tourist traffic in summer, chiefly from the opposite coast of Lancashire. The other towns, Peel, Ramsey, and Castleton, are all on the coast.

Almost equidistant from Ireland, Wales, Scotland, and England, and accessible to Norway through the North Channel, Man has been influenced by all. It was evangelized from Ireland, and ruled from the sixth century onwards from Wales. The Scandinavian tide of conquest reached it at the end of the ninth century, by way of the Faeroes and the Scottish islands. In 1266 it was ceded by Norway to Scotland, but a quarter of a century later it obtained the protection of England. The Crown granted it to the Stanleys, who became kings of Man. After passing in the eighteenth century to a Scottish family Man was bought by the British crown in 1829. The ancient open air folk assembly of Northern Europe still survives, and meets annually to hear new laws promulgated, after which they come into force. Another historic survival is the bishopric of Sodor and Man, dating from the days when Man was united with the

Sodoreys, or Southern Isles, the Scandinavian name of the Hebrides.

IRELAND.

Configuration. Ireland differs greatly in configuration from Great Britain. The mountains are arranged, not in a well marked backbone, but as a broken marginal fringe, between whose detached masses narrow lowlands project from the Central Lowland. These mountain groups form projections of the coast in (1) South-west Kerry, (2) West Connaught, (3) North-west Donegal, (4) North-east Antrim, and (5) South-east Wicklow. Minor ranges rise on the edge of the Central Plain.

South-west Ireland. The mountains of Cork and Kerry are the most continuous in Ireland. They consist of parallel ranges and valleys, which run from west to east, and recall the mountains of South Wales. The western ends have been submerged, so that long narrowing and shallowing inlets, or *rias*, penetrate far inland between long mountainous peninsulas which project west into the Atlantic. In such inlets sheltered harbours are found, as at Bere Haven, protected by Bere Island, in Bantry Bay. Two small islands are important. Clear Island has a lighthouse and signal station at the southern end, which report the movements of Atlantic vessels. Valentia Island, at the mouth of Dingle Bay, the most westerly meteorological station in the British Isles, is the first to announce the approach of storms from the west, the storm quarter.

The climate is mild and equable. The summers are cool but the winters are as mild as those of Southern Italy. The abundant rain, brought by the Atlantic winds, keeps the pastures green. Dairy-farming is therefore important. As in southern England the vegetation of the valleys is richer than in most parts of our islands, and many 'greenhouse' plants can be grown in the open. In the mountains the conditions of life are severe. The hard rock weathers slowly,

the soil is poor and thin, and the rainfall heavy. Both agriculture and pasturage are difficult, and the population is thin and poverty stricken.

FIG. 45. The Rocks of Ireland and the connexion between the structure of Ireland and that of Great Britain. Note that the mountains of Southern Ireland are a continuation of those of South Wales, and their ridges run west to east, instead of south-west to north-east. Cf. Fig. 46.

The highest part of Kerry is between Dingle Bay and the long gulf known as Kenmare River, where Carrantual, in

FIG. 46. Section across Ireland. Cf. Fig. 45.

Macgillicuddy's Reeks, exceeds 3,400 feet. At the eastern base of these mountains are the picturesque lakes of Killarney,

the upper lake a valley lake, the lower one a moraine-dammed island-studded lake of the plains.

The valleys opening east are drained by the Blackwater, Lee, and Bandon. Each of these rivers turns abruptly at right angles, reaching the sea by a transverse gorge through the mountains to the south and not through the eastern continuation of its valley. The lower ends of these gorges are submerged, forming the harbours of Kinsale, Cork, and Youghal. Of these Cork Harbour is the largest. Queenstown, on an island in it, is a port of call for Atlantic mail steamers. Cork, in the fertile Lee valley, is the chief city of southern Ireland, the market and port of an extensive region, which produces bacon and dairy produce of all kinds. It is also engaged in distilling and other industries. A gap in the mountains carries the railway past Mallow, on the Blackwater, where it crosses the Killarney-Waterford line, to the Central Plain.

There was early a considerable trade between these ports and Spain, to which country Ireland frequently looked for aid in her struggles with England as Scotland looked to France.

South-east Ireland. The Galty and Knockmealdown Mountains continue the line of the Kerry and Cork mountains eastwards. They form the southern margin of the wide fertile lowlands of the Golden Vale of Tipperary and Limerick, which extends from the Suir to the Shannon. The Suir rises to the east of the Silvermine Mountains. It flows first south and then east to Waterford Harbour, which receives the united waters of the Nore and Barrow, from the Slieve Bloom Mountains. Tipperary and Cashel are the chief towns of the Golden Vale. The latter, with the famous Rock of Cashel (300 feet), was the capital of the Kings of Munster, whose ruined palace is one of the many antiquities of the town. Clonmel and Carrick are the chief centres on the Lower Suir, Kilkenny, on the Nore, near an anthracite coalfield, and Carlow, on the Barrow, are in the centre of fertile valleys which formed part of the powerful kingdom of Leinster. In

the Anglo-Norman period the vales of Tipperary and Kilkenny were studded with castles and abbeys, most of which were ruined in the civil wars of the sixteenth and seventeenth centuries. The outlet for the fertile valleys of this region is Waterford, near the mouth of the Suir, a packet-station in regular communication with England. It is now superseded for passenger traffic by Rosslare, in south-east Wexford, the port for the new express route to Fishguard in South Wales. Wexford, on Wexford Harbour, is the outlet of the fertile valley of the Slaney, which rises in the Wicklow Mountains, on the southern margin of the Central Plain. The Wicklow Mountains resemble those of North Wales, and reach 3,000 feet in Lugnaquilla. They have been glaciated and contain picturesque valleys and tarns. The most famous vales are those of Avoca and Arklow.

The Central Lowland is a gently undulating limestone area, covered by an almost continuous sheet of boulder clay, the result of former glaciation. It is dotted with small moraine-dammed lakes. Larger sheets of water occupy rock hollows formed by the dissolution of the soluble limestone. Much of the surface consists of bogs with clay bottoms. These render communication difficult, and except for the peat, which is cut for fuel, they are unproductive until reclaimed. In these respects the Central Plain of Ireland is much less suited for dense settlement than the Central Plain of England.

The Eastern Plain is the best and driest part of this central lowland. The lakes are comparatively few, but the Bog of Allen covers a large area in Kildare and Queen's County. The Eastern Plain is drained east to the Irish Sea by the Liffey, from the Wicklow Mountains, and the Boyne, from the Bog of Allen. The Boyne, with its tributaries, is wholly a river of the plain. Its basin forms the rich lowland of Meath.

The winters of the Eastern Plain are cold, the summers are warm, and the rainfall is much less than in the west. Oats, barley, a little wheat, potatoes, and other root-crops are grown.

In the pastoral districts horse-breeding and cattle-rearing are important.

The Eastern Plain opens east to the Irish Sea, opposite to the most westerly extension of the English Plain. It was thus exposed to invasion from England as soon as a strong central power was established in the English Plain. This did not happen till the twelfth century, a century after the Norman conquest. From the ninth century onwards, however, the shores of Ireland were ravaged by the Danes, who forced their way in by Dublin, where the Irish Sea is narrowest, and by such sea-gates as Waterford in the south and the Shannon estuary in the west. The Irish power was concentrated on the Eastern Plain, and the battle which broke the Danish power was fought at Clontarf, close to Dublin, in 1014. More than a century of tribal wars followed, chiefly due to the geographical impediments to unity. The English attack was made when internal jealousies rendered a combined resistance difficult. The invaders pressed up the fertile valleys of Leinster to the rich plains of Kildare and Meath. The choice of Dublin, at once the nearest point to England and the key of the Eastern Plain, as the centre of English rule, was due to the political wisdom of Henry II.

The ebb and flow of English power in Ireland was largely controlled by the geography of the country, even in its minor details. The same causes which had led to the rise of rival chiefs and tribal wars led in the Anglo-Norman period to the rise of great feudal barons whose authority within their own realms was more real than that of the King. The royal authority was little more than nominal outside the Pale, which roughly corresponded with the Eastern Plain. The Pale was but imperfectly defended by the Bog of Allen, and was also exposed to attack from the south through the defiles of the Wicklow Mountains, and from the north through the gate of Dundalk. By the end of the fifteenth century the English sphere of influence had contracted to a narrow coastal strip between Dundalk and the Wicklow Mountains. So vital,

however, is this region to the control of Ireland that the whole island was later reconquered from this base.

Of the three centres of the Eastern Plain, Dublin, Drogheda, and Dundalk, Dublin is by far the most important. It is admirably placed at the southern end of a rich plain, and at the northern base of the Wicklow Mountains. It is opposite to Anglesey, and thus commands the shortest sea route to England. Dublin naturally became the administrative English centre, and developed an important trade with England, and especially with Bristol, then the great western port of England. At the present day it is the seat of government, the residence of the Viceroy, and the intellectual centre of the country. It is an important port, and carries on brewing, distilling, and other industries. In the neighbourhood are many seaside resorts and small towns. Kingston is the port for the mail steamers to Holyhead. Balbriggan, on the line to Drogheda, manufactures hose.

Drogheda, on the Boyne, a port and manufacturing town, with cotton, linen, and other manufactures, is the outlet for the plain of Meath. It was taken by Cromwell in 1649, and by William III in 1690. The battle of the Boyne was fought in the immediate neighbourhood.

The Lower Boyne formed the ancient kingdom of Meath, one of the richest parts of Ireland, and long the predominant power. Tara was the ancient capital, renowned in song and story. Kells is famous in the ecclesiastical history of the country.

Dundalk, on Dundalk Bay, is also a port, with industries similar to those of Drogheda. It is the northern key of the Eastern Plain. Here the invading Bruce, a brother of the Scottish king, was defeated and slain by the English in 1318.

The Shannon Basin occupies the central part of the plain. The Shannon rises in the hills to the north, enters Lough Allen, and flows south through the long loughs of Ree and Derg, through an almost flat tract of country. It receives the Inny and the Brosna on the left bank and the Boyle and

the Suck on the right, both draining many lakes. Round Lough Derg is a crescent of mountain masses, of which the Slieve Aughty and Silvermine Mountains are the most important. The Lower Shannon flows down a steep slope through the heart of these heights to its long estuary. To explain its course we must suppose that it originally flowed southwards before these heights existed, and that it deepened its valley as fast as they were formed. At the head of the estuary is Limerick, probably founded by the Danes, engaged in flour-milling, bacon-curing, and lace-making. It is a considerable port, and an outlet of the Shannon and the Golden Vale.

As in Great Britain, lost causes have often maintained themselves in the west, which were the last parts of Ireland to be conquered by the English. Limerick was the last stronghold of James II in the struggle with William III.

In the pastoral region through which the Shannon flows there are a number of small towns. Athlone, south of Lough Ree, and Carrick-on-Shannon, at the confluence of the Shannon and Boyle, control the possible crossing-places of the river which is broad enough in most of its course to form an effective natural boundary, separating the provinces of Leinster and Munster from Connaught (Connacht).

The Western Plain slopes to the west, where the large lakes of Mask and Corrib, connected by a subterranean stream, carry the drainage south to Galway Bay. Lough Conn discharges its surplus waters by the Moy to Killala Bay. The beds of all these lakes have been dissolved in the limestone.

This is a poor region, with a heavy rainfall, and a thin unprosperous population. Access to the Atlantic is given by Killala, Clew and Galway Bays, with Ballina, Westport, and Galway as their respective ports. Galway formerly carried on a large trade with Spain, and has dwindled in importance since this ceased.

The Connemara Mountains south of Clew Bay and the Nephin Beg Mountains north of it, the latter continued by the rugged Achill Islands, belong to the next region.

The Northern Mountains. In this region the south-west to north-east trend, so characteristic of the feature-lines of Great Britain, is clearly traceable. The mountains are much less continuous than in southern Ireland, forming a number of separate groups with lowlands between.

The Northern Mountains of Ireland are of two different types. Those in the west and north, bordering the ocean from Galway Bay to the valley of the Bann, are composed of old rocks, and resemble the Highlands of Scotland, of which they are the broken continuation. East of the Bann the mountains of the north-east are volcanic.

The mountains west of the Bann are broken into many groups. (1) The boggy infertile Connemara Mountains (2,400 feet), one of the poorest parts of Ireland, are separated by (*a*) Clew Bay from (2) the Nephin Beg Highlands, and these by (*b*) the Moy lowlands from (3) the Ox Mountains of Sligo, between Killala and Sligo Bays. Beyond (*c*) the Erne lowland, with Upper and Lower Lough Erne, leading from the Central Plain to Donegal Bay, rise (4) the Donegal Mountains, with Derryvreagh and Errigal (2,500 feet). These are separated by Lough Swilly from the Innishowen peninsula and by (*d*) the Foyle valley and lough from (5) the mountains of Tyrone and Derry, of which the Sperrin Mountains may be noted.

This region may be broadly compared with the Scottish Highlands. Its much more broken character renders communication easier, towns somewhat more numerous, and population relatively greater. This population, however, is almost confined to the intervening belts of lowland. Cattle are bred in the valleys; sheep are kept in the hill pastures. In the Foyle valley agriculture is carried on. The mountain regions are infertile and poor. The fine coast and mountain scenery of Donegal is attracting tourists, and laying the foundations of an organized tourist industry such as contributes to the prosperity of the Scottish Highlands.

The lowlands afford natural routes, with which the towns

are associated. Westport and Ballina have already been mentioned as gateways to the Central Plain. Sligo is at the end of a route from the Shannon to Sligo Bay. Ballyshannon, at the mouth of the Erne, is cut off by rapids from Lough Erne. Donegal has access to Donegal Bay, and is the terminus of a route from the Foyle. Londonderry is the outlet for the Foyle lowland. All these towns are ports. The inland centres are small. The most important are Enniskillen, between Upper and Lower Lough Erne, and Strabane, in the Foyle valley.

The North-eastern Mountains and Lowlands. The widest of the openings from the Central Plain to the north is by the Bann lowland, where Lough Neagh, the largest lake in the British Isles, fills an area of over 150 square miles in the centre. The Bann lowland is blocked to the east by the lava-capped plateau of Antrim, a continuation of the lava flows of the Inner Hebrides of Scotland. South of this another lowland gate opens by the loughs of Larne, Belfast, and Strangford, the latter bounded by the Ards peninsula, between the Antrim plateau and the much dissected granitic and volcanic Mourne Mountains (Slieve Donard, 2,800 feet), which are separated by Carlingford Lough from the Carlingford Mountains (Slieve Gullion, 1,900 feet).

This volcanic region of tableland and mountain is a thinly-peopled sheep-grazing region. The lowlands are cultivated with cereals (oats, barley), root crops and flax. Fruit orchards are numerous round Armagh. The linen manufacture is important in most of the towns.

Associated with the northern gate are Coleraine, at the mouth of the Bann, with Portrush to the east; with the south-western gate Armagh and Monaghan. Round Lough Neagh or on it are Portadown, Lurgan, and Antrim. The towns of the eastern gate are Lisburn, Belfast, Carrickfergus, and Larne, the port for Scotland, and of the south-eastern gate Newry and Greenore, the port for Holyhead. Canals run from Lough Neagh by the Lagan to Belfast, to Newry and westwards across Ulster.

The tourist traffic is developing in many seaside resorts, especially in the Mourne Mountains. Dungannon is the centre of a small but as yet unimportant coalfield. Most of the coal and iron used in this region comes from Ayrshire and Cumberland through Belfast.

Belfast, the chief port and commercial city of Ireland, is advantageously situated on the east coast. It obtains cheap coal from the Scottish and English coalfields nearest to it, and has easy water communication with many markets. For the linen manufacture, its leading industry, Belfast has the advantages of a moist climate suitable for spinning, and water with fine bleaching properties. Flax is grown locally as well as imported. Shipbuilding is also an important industry, the iron being obtained from the Furness district. Distilling and brewing are carried on with local and imported grain. The rope manufacture, with hemp from the Baltic, and the tobacco industry are also prosperous.

Ulster, which includes most of this and of the preceding region, belonged to the O'Neill princes. At the end of the sixteenth century O'Neill, Earl of Tyrone, headed a semi-national movement against the English, and made a long and obstinate resistance in the country round the south-western gate, between Lough Neagh and the Erne, an intricate network of rivers, lakes, and woods. Such a region is most easily reduced by the systematic devastation of the country by fire and sword, a process in which the English were soon aided by famine. To repopulate the country, to restore its ruined prosperity, and to counterbalance Irish influence, the best parts of the confiscated O'Neill lands in Armagh, Cavan, Monaghan, Fermanagh, Tyrone, and Donegal were settled with Scottish and English colonists. Down and Antrim, both within a few miles of Scotland, had long attracted settlers from that country. This plantation of Ulster at the beginning of the seventeenth century led to economic progress, but sowed the seeds of fresh trouble. Outside the poorer districts, which were left to the Irish, Ulster has ever since been opposed to

the greater part of Ireland in religious and political sympathies.

From time to time the Irish Catholics have risen in rebellion. The revolt which began in 1641 was severely repressed by Cromwell, who extended the plantation system and strengthened the Protestant ascendancy. The Irish Catholics declared for the Stuarts at the time of the Revolution, while the Ulster towns were on the Orange side. Enniskillen and Londonderry were filled with refugee colonists, the latter city suffering a long and memorable siege. The rebellion of 1798 was both a religious and political civil war, in which the better organized Protestants were victorious. The suppression of this rebellion was followed by the Act of Union in 1801.

THE ISLANDS NORTH OF BRITAIN.

The recent volcanic rocks, which occur in Antrim and the Outer Hebrides, can be traced northwards through the Faeroe Islands and Iceland.

The Faeroe Islands, politically Danish, lie midway between Scotland, Iceland, and Norway. They are mountainous and rise steeply from the sea. The climate is equable and wet. Barley and potatoes are the chief crops. Sheep are kept in the hill pastures. The occupations are those of the Norwegian coast (see p. 156), from which the Faeroes were originally settled, but the life is of a more primitive type.

Iceland lies nearly 600 miles from Norway, and only 150 miles from Greenland. It is larger than Ireland, but has only one-hundredth part of the population. The coast is pierced by fiords and bays, with many good harbours. The interior is a volcanic highland, with peaks reaching 6,000 feet. Signs of violent volcanic energy are shown by the active volcano of Hekla (over 5,000 feet), the mud volcanoes, the geysers, or hot-water volcanoes, and the vast lava-flows of older eruptions. Owing to the high latitude the snow-line descends in the

north-west to 1,500 feet and the valleys are filled with glaciers, which creep down to the sea. The climate is cool at all seasons, but the winters are least severe in the south owing to the warm westerly drift. The island has been cleared of the sub-arctic forest which once covered it and turf is burned for fuel. Agriculture is limited to the growing of potatoes and oats. There is good pasturage in summer, and sheep, cattle and ponies are bred. Icelandic fishermen visit the fisheries of the North Sea and of the Atlantic and Arctic Oceans. The capital is Reykjavik, founded in the ninth century near the mouth of a fiord on the south-west coast.

It is disputed whether Irish or Norwegian fishermen first visited Iceland, but the effective colonization was from Norway. The fisheries were very important in pre-Reformation days. In the fourteenth century Iceland passed with Norway to Denmark, which retained it when Norway was united to Sweden. Iceland has a rich and ancient literature, which includes the famous sagas or Scandinavian epic legends.

SCANDINAVIA.

The Scandinavian Peninsula. Scandinavia is the mountainous north-western peninsula of Europe. Structurally it is a link between the north-western highlands of Britain and the lowlands of Eastern Europe.

The Scandinavian peninsula is separated from the mainland of Europe by the Skagerak and the Kattegat, which divide it from peninsular Denmark. They lead by the straits of the Great and Little Belts and the Sound between the Danish Islands to the shallow Baltic Sea.

Configuration. The east and south are low and flat or gently undulating. The land rises steadily westwards to a highland whose western margin, deeply indented by innumerable fiords, falls steeply to the North Sea. This western highland is highest in the south, where the great masses of the Hardanger Fjeld, Jöstedals Brae, Jötun Fjeld, and Dovre Fjeld, with Snaehätten (7,570 feet) form a bleak, unfertile, and

uninhabited region. North of the depression of Trondhjem Fjord is the Kjölen or Keel, where the highland reaches nearly 7,000 feet before it sinks to the Finmark plateau and the Arctic Ocean.

The east and west of the Scandinavian peninsula present a marked contrast. The whole peninsula was covered by the ice sheet of the Ice Age. In the west and north the rocks have been left bare, but much of the south and east is covered with morainic deposits. Some of the low rocky islands of the eastern skerry guard, or island fringe, have a morainic covering. The western skerry guard is mountainous, and consists of outlying parts of the mountainous peninsulas separated from them by the sea, which converted depressions in the land into sounds. In the north the lofty Lofoten Islands are cut off from the mainland by the Vestfjord. They resemble the Outer Hebrides in position and characteristics.

Climate. The contrast between the east and west of the peninsula extends to the climate. That of the east is continental, with very cold winters and hot summers. The rainfall in the east is small and occurs mainly in summer. It is greater in the south than in the north.

The west has the typical climate of the western storm belt, with rain at all seasons but most in winter. Here the rainfall is heaviest in the south, where the land is highest, and least in the north, which is colder. The winters are remarkably mild for the latitude. While the Baltic shores are frozen for many months, those of the west are ice-free even in the extreme north. This is due to the influence of the west winds which drive waters from the warmer regions of the ocean in a north-easterly direction, causing what is often called the Gulf Stream Drift or the Westerly Wind Drift.

The interior is cool at all seasons and very cold in winter. In the Jötun Fjeld and Jöstedals Brae the snow accumulates in the higher valleys, which are filled by glaciers (see p. 68). The relatively low Finmark plateau in the north is cold at all seasons.

Western Scandinavia or Norway. Norway occupies the steep western slope of the Scandinavian highland. The fiords which dissect its coast are separated from each other by high mountain walls, over which the short mountain torrents fall in lofty cataracts. Communication by land is extremely difficult. By sea, on the contrary, it is easy. The skerry guard forms a natural breakwater, and the deep sounds between the islands and the mainland are generally calm. These sounds and the fiords opening from them are the real roads of the country.

Except in the extreme north, where Finmark is passing into tundra, agriculture and pasturage are carried on to the very limited extent permitted by the bare and mountainous character of the country. In the extreme south is a lower undulating region, exposed to the westerly winds, where oats and barley are cultivated in clearings of the heavily forested land. The capital, Kristiania, at the head of Kristiania Fjord, is in the centre of this richer land, across which railways radiate to the chief towns of Norway and Southern Sweden.

Norway offers an interesting parallel to ancient Phoenicia (see p. 21). In both cases the character of the interior prevented expansion inland, and the sea offered at once the most convenient highway and the best means of livelihood. The Norsemen, like the Phoenicians, and for similar reasons, have become a nation of shipbuilders and traders, carrying goods for countries possessed of greater natural resources. A large proportion of Norwegian savings is invested in shipping, and the mercantile marine is very large. The fisheries of the Lofoten Islands and the more distant fishing-grounds visited by Norse sailors, supply important exports. The iron mines of Sweden also find an outlet by the ice-free port of Narvik, on the Ofoten Fjord, the terminus of a railway from the Baltic.

Both Phoenicia and Norway had to provide for population when it increased beyond the capacity of the limited home area. The history of the Phoenician colonies has already been traced (see p. 22). Similarly the Norsemen became

sea-rovers, or vikings (vik-ing = bay-man). Their raids on Britain, France, the Mediterranean, and even Constantinople, made them the terror of Europe in the first half of the Christian Era. They also pressed north and west to Iceland and Greenland, and probably reached the mainland of North America about 1000 A.D. At the present time a steady stream of Scandinavian colonization pours into North America.

The power of Norway originally developed round Kristiania Fjord, and was extended northwards by conquest to Trondhjem (capital in tenth century). This was followed by expansion to the various North Sea islands (see p. 141).

All the important towns of Norway are on the coast. Stavanger, near the mouth of the Bukke Fjord, and Bergen, once an important Hansa port (see p. 159), both have important shipping interests. Trondhjem, on Trondhjem Fjord, is advantageously placed on a deep fiord which penetrates far inland, where the highlands are lowest and easy routes lead eastwards across the peninsula to the Baltic and southwards by the Glommen to Kristiania in the south, past the copper mines of Röraas. In the north the small ports of Tromsö and Hammerfest are frequented by local or arctic fishing fleets.

Eastern Scandinavia or Sweden. Sweden consists of the longer, gentler slope of the Scandinavian Highlands, and of the western extension of the Baltic plateau, above which this highland rises. The southern half, the southern extremity of which is known as Scania, is the richest, most thickly peopled, and most progressive part of Sweden. It contains the ancient universities of Lund and Upsala, while Stockholm, the capital, has scientific and technical institutions of the first rank. Southern Sweden is a forested land, diversified by the large lakes of Vener, Vetter and Mälar, and innumerable smaller ones. The whole region has been glaciated and is broken by morainic heights of various types. Rye, barley, oats, root crops, and even a little wheat are grown in the clearings. Dairy-farming is very important. Manufactures

are beginning. The textile manufacture is chiefly carried on at Göteborg, Norrköping and Stockholm.

Göteborg, on the Kattegat, is the chief western port, and the western entrance to the Göta Canal, which utilizes the large lakes of Vener and Vetter and reaches the Baltic at Söder-

FIG. 47. The Entrances to the Baltic and the Lands bordering them.

köping. Helsingborg and Malmö, on the Sound, are channel ports. Karlskrona and Norrköping are the chief eastern centres, after Stockholm, the capital, which is built on islands at the sea entrance to Lake Mälar. On an arm of this lake is Upsala, the ancient capital and university.

Throughout this region there is enough fall in the rivers to give cheap electric power. This is used for various purposes in towns, on the forest margin in sawmills, and in making wood-pulp, paper, and joiner work, and above all in the iron and electro-chemical industries.

North of Lake Mälar Sweden consists of two different regions. A densely forested lowland borders the Baltic. Above this is a fairly well-marked escarpment, the eastern edge of the Scandinavian Highlands, which rise through forested lower slopes to the bare feld of the interior. The eastern escarpment is notched by steep glaciated U-shaped valleys (see p. 69). These valleys contain the heads of picturesque lakes, which resemble Loch Lomond, and like it are partly in the highland and partly in the lowland area.

North of Lake Mälar are two rich iron-ore regions. The southern lies between Lake Vener, Grängesberg, and Dannemora. The northern includes the districts of Gellivara and Kirunavara, within the Arctic circle, with Luleå as the Baltic port, and Narvik, in Norway, as the ice-free winter port. All Luleå iron is manufactured with charcoal.

The Scandinavian Hansa Towns. The Baltic Sea, which is connected by the straits already mentioned with the North Sea, is a natural route penetrating far into Eastern Europe. It forms a northern Mediterranean, but the climate and character of the surrounding lands are much less favourable to dense settlement. From early times a considerable overland trade was carried on between the Mediterranean and the Baltic, furs and amber being among the goods carried. In the Middle Ages the Hanseatic League was formed among the trading cities of Northern Europe, largely as a protection against the Scandinavian pirates who infested the North and Baltic Seas. The Baltic trade was then very rich, for the Baltic was the only outlet for the furs, hides, tallow, &c., of Russia, for the metals and timber of Sweden, and for the rich herring fisheries of the Sound. Visby, well situated on the island of Gotland in the middle of the Baltic, was the great

Hansa dépôt, and gave its name to an international maritime code. Many causes led to the decline of the Hansa power in the Baltic. The discovery of the sea route to Archangel in the middle of the sixteenth century gave Russia an alternative outlet. Archangel was an important port until the founding of St. Petersburg brought most of the Russian trade back to the Baltic. In the fifteenth century the herring began to desert the Baltic for the North Sea, greatly to the advantage of Holland. The Reformation decreased the demand for fish, and for tallow for church candles. Finally the discovery of the New World made the North Sea ports prosperous at the expense of their Baltic rivals.

Historical Summary. The history of the Baltic, like that of the Mediterranean, is extremely complicated. The ease of communication has led to a continual ebb and flow in the balance of power. As Norway naturally sought to expand in the lands bordering the North Sea, the Atlantic, and its great Mediterranean gulf, so Sweden looked east to the immense lowlands opening from the Baltic. Her rivals were Denmark, which held Scania from the ninth to the seventeenth century, Poland, which reached the Baltic by the Vistula, and the power which ultimately became Russia (see p. 164). In the seventeenth century Sweden was at the height of its prosperity and was the chief Baltic power, holding much of what is now Prussia, and Esthonia and Livonia in what is now Russia. This domain was too large, straggling, and thinly peopled to be permanently held, and in a relatively short period Sweden was stripped of the lands outside the peninsula. The foundation of St. Petersburg was a defensive measure to prevent the further expansion of Sweden in the eastern Baltic.

There has never been a permanent political union between Sweden and Norway, which are separated, except in the south, by a highland barrier, effective because of its infertility rather than because of its height. Sweden, Norway, and Denmark were united at the end of the fourteenth century, but in the sixteenth century Sweden again became politically and econo-

mically independent. At the beginning of the nineteenth century Norway was separated from Denmark and united to Sweden. This forced union was ended at the wish of Norway in 1905.

THE RUSSIAN LANDS.

Configuration. On the west, European Russia includes (1) the eastern portions of the Baltic Heights, and (2) parts of the Karpathian Foreland. Its geographical unity is based on the great lowland which stretches from the White to the Black Sea, and round the southern base of the Urals far into Asia. The west is the region of diversity; the centre and east of uniformity.

The Russian lowland includes European Russia, Turan, and Western Siberia. East of 90° E. Eastern Siberia rises in the south to the Central Mountains of Asia, a higher, broader continuation of the Central European Mountains, and in the east to the Aldan and Stanovoi Highlands, which form part of the Central Asiatic Highlands. These fall steeply to the Sea of Okhotsk, which is enclosed on the east by the high volcanic peninsula of Kamchatka, connected through the Kurile Islands with Japan and the volcanic highlands of Eastern Asia.

Climate and Products. Russia has a great range of climate, from that of the tundra along the Arctic Ocean to that of the Mediterranean in the south. Owing to the great distance from the open ocean, and the extension of the land mass across two continents, the climate is everywhere extreme. The lowest winter temperatures on record are experienced at Verkhoyansk in Eastern Siberia (67° 33′ N. lat. 133° 51′ E. long.) where a temperature of −92° F. has been recorded. This is sometimes called the Earth's pole of cold. The January isotherm of 32° F. (frost) cuts the Black and Caspian Seas, and the rivers flowing to them are ice-bound in winter. In Asia it passes south of the southern border of the Empire. Over much of the region the summer temperature is from 70° to 80°. The climate is everywhere dry.

The zones of tundra (see p. 1), taiga (p. 5) and steppe (p. 5) are well marked, stretching as broad belts from west to east. The northern limit of the forest is broadly that of the glacial soil left by the European ice-sheet. The most fertile part of the steppe is the Black Earth zone, south of the forest belt, where wheat and rye are grown—the former for export, the latter for local consumption and distilling. Round the depression of the Caspian and Aral Seas the steppe is salt and infertile.

The Lowlands of European Russia. Russia is not a uniform plain. The rivers cut deep ravines and those flowing south have usually a high right and a low left bank. The low Valdai Hills (1,100 feet) form the orographical centre. To them converge lines of low heights separating the river basins. The Baltic Heights are continued east through Kurland, Livonia, and Esthonia. Between the Pripet or Rokitno swamp, drained to the Baltic and Black Seas, and the Valdai Hills, are the low West Russian Heights, drained to the Baltic by the Niemen, Western Dvina, and Volkhov, and to the Black Sea by the Dnieper. East of the Valdai the North Russian Heights can be traced to the Urals, and separate the Northern Dvina and Pechora, flowing to the Arctic Ocean, from the Volga, flowing to the Caspian. Between the Volga and the Dnieper are the Central Russian and Volga Heights, the latter forming the high right bank of the Volga. Between them is the valley of the Don. Though swellings rather than well-marked heights these southern heights suffice to turn the Don and Dnieper east in their southern courses, bringing the Don within 40 miles of the Volga, and giving the landlocked Caspian relatively easy communication with the Black and Mediterranean Seas. Water communication is everywhere easy in Russia in summer, the rivers either rising in the same marshes or approaching each other in other parts of their course. This has facilitated the construction of canals.

The chief obstructions to communication are forests and

swamps. These have had much influence on the direction of routes and the distribution of population. The marshes are chiefly due to morainic deposits. These are impervious and irregular in surface, with imperfectly drained lakes or marshes in the hollows. As such a region becomes drained, the lakes diminish to swamps. The Rokitno swamp (35,000 square miles) is being artificially drained. Finland, or Fenland, is honeycombed with lakes of all sizes, filling rock basins formed by glaciers. The triple lake of Saima is one of the largest in Europe. The great lakes Onega and Ladoga fill part of a depression which extends from the Gulf of Finland to the White Sea.

Routes into Russia. Russia is reached from the Mediterranean by the Marmora and Black Seas. Greek colonies were early planted along the northern shores of the latter. Other routes to Southern Russia are by the Transylvanian passes into Romania, or by the Danube. The rise of Byzantium increased the importance of these southern routes. The northern route is by the Baltic or by the Central Plain across the middle Vistula, between the Baltic Heights and the Karpathians. Warsaw, the key of this route, also commands a route to St. Petersburg north of the Western Heights by Vilna and Dvinsk (Dünaberg), and one between them and the Rokitno swamp by Smolensk to Moscow. Its political and strategical importance are thus great. Kiev on the Dnieper commands all the routes between north and south, west of the Central Russian Heights.

The route from Asia is round the southern base of the Urals across the steppe. This was followed by the Mongol invaders of Russia and the Russian invaders of Asia.

The Expansion of Russia. The older centres, Novgorod and Kiev, were both in the west. This is explained by the importance of the Baltic in the north and of Byzantium and the Black Sea in the south. Both date from the ninth century. Novgorod, on the Volkhov, a little below its exit from Lake Ilmen, commanded routes to the

Volga as well as to the Baltic. It early became a Hansa town, and the great market of north-east Europe. Kiev, built on heights above the Dnieper, opposite the confluence of the Desna, also had easy access to the Volga. Moscow, the third centre, was founded by settlers from Kiev, on heights above the Moskva, a sub-tributary of the Volga, midway between the White, Baltic, Black, and Caspian Seas. Six railways enter it to-day, a proof of its natural advantages as a route centre. Its rapid growth showed that there was room for a power east of the existing European centres, with the Volga as its highway. The picturesque Kremlin, with its palaces, churches and forts, was built on a height on the left bank in 1300, and a few years later Moscow became the ecclesiastical capital. In the preceding century Mongol invaders poured into Russia by the steppe and exacted homage from the Russian princes. Their actual settlement was confined to the steppe, where Kazan and Tsaritsin were their centres. In the fourteenth century they lost Kiev to the Lithuanians, then expanding along the Karpathian foreland. In the fifteenth century Ivan the Great crushed Novgorod and other rivals, revolted against the Mongols, and made Moscow the capital of Muscovy, which extended to the White Sea. In the following century Ivan the Terrible assumed the title of Tsar, drove the Mongols from Kazan and Astrakhan, and extended his dominions to the Black and Caspian Seas, and into Siberia. At the end of the sixteenth century Russia marched with (1) Sweden, from whom the Baltic provinces were won a century later, (2) Poland, whose partition in the eighteenth century gave Russia the Vistula and the Karpathian provinces, and (3) Turkey, at whose expense Russia expanded to the Black Sea. Finland was added early in the nineteenth century, since when Russian extension has been chiefly in Asia.

Northern Russia. Northern Russia sinks from the North Russian Heights to the depression between the Gulf of Finland and the White Sea. The soil is cold and marshy, and the

climate severe. The southern part is forest, the northern tundra. Archangel, long the only Russian port, is ice-bound from September to July. It exports the produce of the forests (timber, pitch, tar), fisheries (train oil), and grain brought from Siberia by a new line to Kotlas on the Northern Dvina.

Finland. Finland is an undulating plateau, covered with forests, lakes and swamps, and passing into tundra in the north. The clearings are meadows, in which dairy cattle are bred. In the north the reindeer is the only domesticated animal. The rivers have sufficient fall to provide water and electric power for saw, pulping, and paper-mills. Other forest produce is timber, pitch, and resin. Helsingfors is the capital, and Abo the second town and port.

The Baltic Provinces. These resemble the adjoining parts of Germany, and consist of a forested lakeland, with a poor glacial soil, in which coarser plants (hemp, sugar-beet, rye) do best. The scanty population is confined to the valleys and coast towns. From the forests much timber is floated down to the Baltic. Revel, in Esthonia, Riga, in Livonia, and Libava, in Kurland, give Russia Baltic outlets for her Siberian produce. To Russianize this region, then lately conquered, St. Petersburg was built early in the eighteenth century in the Neva marshes. It is now joined to the Gulf of Finland by ship-canal. It is the capital and administrative centre, and has important manufactures. The entrance to the Neva, which is frozen in winter, is defended by Kronstadt.

Poland, Volhynia, Podolia, Little Russia. Poland consists of the plains of the Vistula at the base of the Karpathian foreland. The forests send timber down the Vistula to the Baltic. Flax and hemp are largely grown. The minerals include coal, making Poland an industrial and thickly-peopled region. Lodz is one of the great textile centres of Europe. The capital is Warsaw, a centre of routes, railways, and manufactures. Little Russia is in the

rich Black Earth zone, where vast crops of cereals are grown. There is coal in the Donets basin, where Kharkov is the chief manufacturing centre.

New Russia. The steppes round the Black Sea are less fertile, and the keeping of animals replaces agriculture. Odessa, built on the high edge of the steppe where it reaches the Black Sea, has an immense trade in steppe products. The agricultural steppes supply grain, flour, and starch. The pastoral steppes supply leather and soap, which is made from mare's milk. Kherson, the outlet of the Dnieper, has a great wool-cleaning industry, and manufactures soap and tallow. Rostov draws from the agricultural steppes the raw material for maccaroni, and from the pastoral that for its leather and soap manufactures.

Crimea. In the south the Crimea is mountainous, and in the sheltered valleys which open to the south all kinds of Mediterranean products flourish. It is the Riviera of Russia. Sevastopol is a strongly fortified harbour at the western end of the Yaila mountains.

Central Russia consists of heights drained north by the Oka to the Volga. Orel, Tula, and Moscow are centres of an industrial and thickly-peopled coalfield. The varied industries of Moscow include textiles, especially cotton from Russian Central Asia, metal industries, machinery and carriages, paper made of wood-pulp from the forest region, tanning and shoe manufactures from hides from the steppes. It is also a great distributing centre, especially for tea.

The Upper Volga and Kama Basin is a wedge of lowland between the Urals, drained by the Kama, and the North Russian and Volga Heights. It is in the heart of the forest region, and rivers are the chief means of communication. Much traffic comes down the Kama and Volga for Moscow, on the margin of this region, and St. Petersburg, which is connected with the Volga by canals. The towns are all on rivers. Nizhni Novgorod, at the confluence of the Oka, rose in commercial importance after the fall of Kazan. At

the fair which takes place in August and September, on a sandy plain between the Oka and the Volga, the trade of two continents is focussed. Kazan, on heights above the flood level of the Volga, was the capital of the Mongols of the Golden Horde, and a great trade centre. It manufactures leather and soap. Perm, on the Kama, and Ufa are on the northern and southern routes to the mining districts of the Urals.

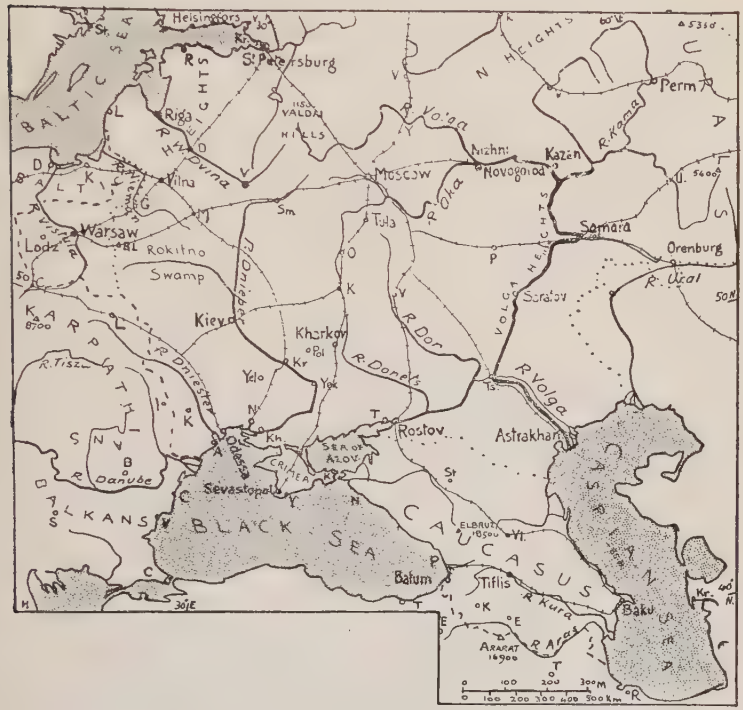


FIG. 48. Russia in Europe.

The Lower Volga. The lower Volga flows east of the Volga Heights. These form the high right bank, on which are many windmills for grinding flour. The left bank is low. Samara, at the end of the Volga loop, is on the route through

Orenburg at the base of the Urals to the steppes of Central Asia, and also on the great railway to Siberia. Saratov is in the heart of the Black Earth region. Tsaritsin is only forty miles from the Don, with which it is connected by rail. The Volga is here sixty feet below sea-level, and enters the Caspian by a marshy delta. The settled population of the Lower Volga is small. Nomadic tribes follow their herds from pasture to pasture. The sturgeon and seal fisheries of the Caspian are important. Caviar, made from sturgeon roe, is exported from Astrakhan, the port of the Caspian, which is connected by river and canal with the distant Baltic.

The Caucasus and Transcaucasia. The depression between the Azov and Caspian Seas rises in the south-west to the Caucasus, which stretches from the Black to the Caspian Sea, forming a formidable barrier between north and south. It is a wild region of rugged parallel ranges, densely forested in the valleys and on the southern slopes, with glaciers in the higher valleys. Elbruz, an extinct volcano (18,470 feet) is the highest point, but many summits nearly reach 17,000 feet. Vladikavkaz, on the Terek, which drains the steep northern face, is a Russian trade and military centre. It commands the route by the Dariel or Cross Mountain Pass to Tiflis, the old capital of Georgia, in the ravine of the Kur, between the Caucasus and the Armenian Mountains. The lower Kur valley is a broad fertile lowland opening to the Caspian, with Baku in the north as the outlet for a rich oil region. At the Dariel Pass the Caucasus is only sixty miles wide, but the railway from Vladikavkaz to Tiflis has to skirt the northern and eastern base of the mountains to Baku, and reach Tiflis up the Kur valley, a détour of several hundred miles. From Tiflis the line is continued west to the Rion valley for Poti and Batum, the Black Sea ports. The Kur and Rion drain the high plateau of Georgia, which connects the Caucasus with the Armenian Plateau. Erivan, at the foot of Ararat, is the centre of difficult routes between Asia Minor and Persia. Everywhere in this region

the highlands are inhabited by wild pastoral tribes, who frequently raid the settled agricultural people of the lower valleys.

Turan, or Russian Turkestan. East of the Caspian the land rises to the low Ust-Urt plateau. Between this and the Urals to the north, and the bordering mountains of Turan to the south, are lowlands leading to the steppes of Central Asia. Turan is the lowland at the base of (1) the lofty mountains of Khorasan, separating it from Persia, (2) the Hindu Kush, separating it from Afghanistan, (3) the Pamirs, where the frontiers of four powers meet, and (4) the Tian Shan, between Russian and Chinese Turkestan. Most of Turan is a dry barren steppe, with salt lakes and sandy deserts. The advance of the sand dunes is now arrested, as in the French Landes, by planting.

The glaciers of the lofty mountains to the south and east feed the Amu Daria, the ancient Oxus, and the Syr Daria, or Jaxartes, both flowing to the Sea of Aral, at the eastern base of the Ust-Urt plateau. The other rivers spend their waters in the creation of fertile oases, and lose themselves in the sands. Merv owes its existence to the Murghab, Khiva to the Amu, Bokhara and Samarkand to the Zerafshan, and the rich Ferghana valley, where cotton is increasingly grown for the Moscow mills, to the Syr. Near the end of the Ferghana valley is Tashkent. The Transcaspian line from Krasnovodsk on the Caspian links all these oases, in which rice, wheat, cotton, and many fruits are grown. From Tashkent it runs by the Syr to Orenburg, round the western margin of the Kirghiz steppe, which separates Turan from Siberia. In the extreme east the Ili flows to Lake Balkash, but is less fertile than the western valleys. Except in the irrigated oases the chief occupation, wherever pasture is sufficient, is the keeping of camels, cattle, sheep, and horses. As these must move from pasture to pasture, this involves a wandering life with tents instead of fixed villages.

The oases mentioned lie between two great barriers to

communication. These are the deserts and poor steppes round the Caspian and Aral Seas in the north, and the high mountains to the south and east. They thus form the easiest route between the Caspian and the Far East. Beyond Ferghana the route either passes to the Tarim basin of Chinese Turkestan over high and difficult passes, or goes by Lake Balkash to the Zungarian Gate between the Altai and the Tian Shan. The former was the old trade route between Assyria and the jade quarries in Southern Turkestan, which was followed and described by the Venetian traveller Marco Polo in the thirteenth century. Invader after invader has swept over the oases of Turan, destroying and rebuilding their cities. Merv is one of the oldest cities in Asia. Here the route from Bokhara to Meshed, the capital of Khorasan, intersects that from Khiva to Herat, in Afghanistan, the latter one of the keys of India. The surrounding country is covered by the ruins of its predecessors. Alexander the Great, who reached Turan from Afghanistan (see p. 178), destroyed Samarkand and other cities, and founded many others. The Arab conquest of the eighth century A.D., was made by the passes from Khorasan. Bokhara and Samarkand became centres of Mohammedan learning, but during the Mongol invasions of the thirteenth century their famous libraries were burned. Their glory revived when Tamerlane, the greatest of the Mongols, made Samarkand his capital and adorned it with splendid buildings. In the fifteenth century it had famous schools of astronomy and mathematics. As the Mongol power declined their empire in Turan broke into small units, each based on the possession of an oasis. All these have been absorbed by Russia during the last half century, the local ruler being in some cases recognized. New Russian towns are growing up beside the old cities, whose names they bear. The old caravan routes are largely superseded by the Transcaspian Railway.

Western Siberia. The Urals form the conventional boundary between Europe and Asia, though they do not interrupt the continuity of climate and vegetation in the low-

lands on either side. They rise gently on the European side, but slope more steeply to the Siberian lowland on the east. The passes across them are numerous and easy, and they offer no serious obstruction to communication. The central Urals are forested and are rich in minerals, especially gold, platinum, and coal.

Roughly parallel to the Urals is the line of the Tobol and Lower Ob, the lowest part of Western Siberia, to which flow, from the Altai, the Irtish and Upper Ob, navigable respectively to Semipalatinsk and Barnaul in the dry steppes at the base of the mountains. As early as the sixteenth century the Russians defeated the Mongols on the Tobol, and they never lost the footing thus gained. Tobolsk was long the administrative centre of Siberia. Situated at the confluence of the Tobol and Irtish, it commanded routes to the fertile Kirghiz steppe as well as to the Zungarian Gate and the Far East.

The climate of Western Siberia resembles that of Russia, but with greater extremes of climate, and still less rain. The rain falls chiefly in summer. Along the Arctic Ocean the tundra is inhabited by nomadic tribes, who live by keeping reindeer and fishing. The forest zone supplies furs. As communications improve the forests will yield valuable timber, but it cannot be cheaply transported by floating down stream, as the rivers flow away from the centres of population. The impediments to communication are forests and marshes. The whole of Western Siberia is of comparatively recent formation, and as yet imperfectly drained. The routes, therefore, whether of the invading Mongols or of the modern railway, are forced south to the firmer ground north of the Kirghiz steppe. This the railway traverses, crossing the Irtish at Omsk. Omsk is the centre of the agricultural region of Siberia, where rich harvests are reaped in the virgin Black Earth. Stock-keeping and dairy-farming are rapidly developing, and excellent meat and butter are exported. The nomadic Kirghiz, with their primitive mode of life, are gradually being pressed south into the less fertile steppes by Russian settlers.

Eastern Siberia. The divide between the Ob and the Yenisei is close to the left bank of the latter, which runs almost due north from the Sayan Mountains to the Arctic Ocean, receiving all its tributaries from the east. The most important is the Angara, which rises in the highlands north of Mongolia, and flows through the rift filled by Lake Baikal, one of the deepest freshwater lakes in the world. Close to its western shores are the headwaters of the Lena, flowing first north-east and then north to the Arctic Ocean, and like all Siberian rivers receiving its principal tributaries from the east. Beyond the

FIG. 49. Lowlands of Northern Asia.

Lena, in north-east Siberia, a crescent of mountains with the long slope to the north is drained by considerable rivers to the Arctic Ocean.

Eastern Siberia, between the Yenisei and the Lena, is a low plateau, above which rise tabular volcanic heights. The climate is dry and extreme. At Verkhoyansk, inside the mountain crescent, the average January temperature is $-61{\cdot}2°$ F., the lowest in the world, the average July temperature is $58{\cdot}6°$ F., and the range is 120 F°., the greatest known. Eastern Siberia lies wholly in the tundra and forest zones. In the south it rises rapidly to the

northern buttresses of the Central Asian Mountains. The Siberian line skirts their northern base, entering the forest zone at Krasnoyarsk, on the Yenisei, in the centre of a mining district. The line rises steadily to Irkutsk, on the Angara, forty miles below its exit from Lake Baikal. Irkutsk is the largest town of Siberia, and the capital of Eastern Siberia, with fine educational institutions and important gold-smelting works. The chief town on the little used Lena is Yakutsk. The rest of Russian Asia is in the Central Mountain region (see pp. 181–5).

Routes of Siberia. All the Siberian rivers are navigable

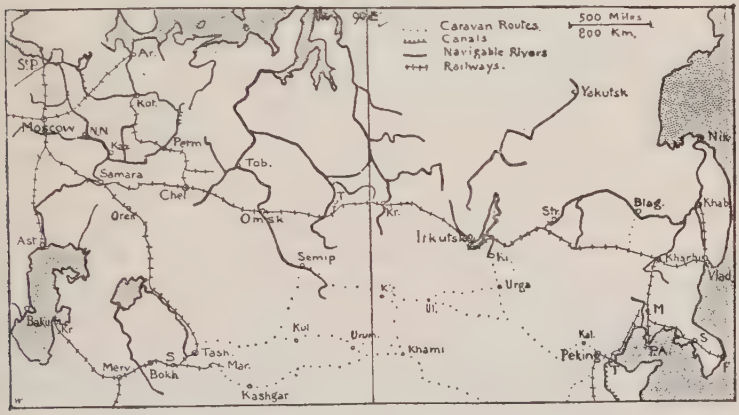


FIG. 50. Routes and Towns of Northern Asia.

in summer for long distances, but they flow to an ice-bound sea, and their lower courses are frozen for many months in winter. During the spring thaws the floods convert the surrounding country into vast lakes. The main streams, therefore, are of little use as routes. The eastern and western direction of their tributaries, on the other hand, has contributed to the rapid expansion of Russia. Russian expansion eastwards differs from the earlier Mongolian expansion westwards. The Russians made much use of boats, but the Mongols were horsemen, who could not advance by water, or through forests, and were

obliged to keep south along the steppe which supplied firm ground and pasture.

The Siberian routes are difficult during the severe winters, when the country is covered by snow. Water for the train has to be brought hot, lest it should freeze on the way. Long icicles of frozen steam gather on the engines. On the other hand, meat and butter can be transported without refrigerating cars, which are necessary in summer. In winter the steppe is impassable for horsemen, and many nomadic tribes settle down in rude villages.

THE CENTRAL MOUNTAIN BARRIER.

The Mid-World Mountains. Asia, like Europe, is crossed from east to west by a mountain barrier which interrupts communication between north and south. The Central Mountains of Asia are a continuation of those of Europe and North Africa, the whole forming the Mid-World Mountain System.

The Mid-World Mountains have already been traced from the western extremity of the Mediterranean through the mountains of Asia Minor to the Armenian Plateau, with which the Caucasus is connected (see p. 168). In this Armenian mountain centre the Euphrates and Tigris rise. Their broad lower valleys form Mesopotamia, a fertile lowland opening to the Persian Gulf between the tableland of Arabia and the mountains of Western Iran. The breadth of the mountain barrier between the lowlands of Turan and Mesopotamia is under 400 miles.

Iran. Eastwards from the Armenian plateau ranges diverge north and south, enclosing the lofty plateau of Iran, which has an elevation of about 3,000 feet. Here the mountain barrier, between Turan and the Arabian Gulf, is over 800 miles broad. Iran is divided politically into Persia in the west, and Afghanistan and British Baluchistan in the east.

Western Iran. The mountain barrier is difficult to cross. Routes run from Trebizond, on the Black Sea, by Erzerum, and

from Tiflis by Erivan, to Tabriz (4,500 feet), the chief town of Persian Armenia. On the north the Iran plateau is bordered

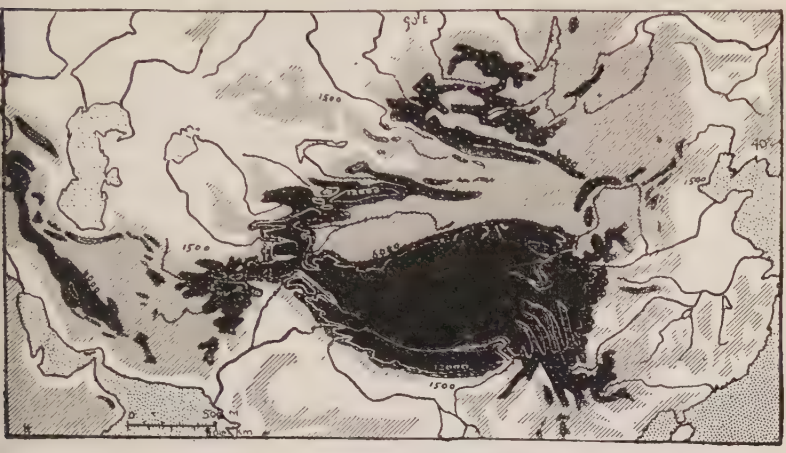


FIG. 51. The Mountain Barriers of Central Asia.

by the Elburz Mountains, with the volcanic cone of Demavend (19,000 feet). Sloping steeply to the Caspian Sea, this

FIG. 52. The Mountain Systems of Central Asia.

lofty range, which in parts is 200 miles broad, intercepts all the rainy winds from the north, rendering the interior of Iran

extremely dry. Between the parallel ranges are high valleys, with agricultural and pastoral villages. Enzeli, on the Caspian, is the port of Resht, the centre of the silk trade. From Resht a route goes by the Kizil Uzen, which breaks north through the mountains, to Teheran, the capital of Persia, at the base of Demavend. East of the Elburz the mountains of Khorasan descend steeply to Turan. Wheat, tobacco, cotton, hemp, &c., are grown in the valleys, but the keeping of animals is more important, and Khorasan carpets are among the finest made.

FIG. 53. Chief Routes and Towns in Persia.

Meshed, the chief town, is the centre of the routes between Turan and Afghanistan.

The ranges which border Western Iran on the south form the Kurdistan highland, and the lofty parallel limestone ranges of the Zagros Mountains. The latter are a karst region, with vanishing rivers and broken valleys, and like the Dinaric Alps, where the structure is similar, they are very difficult to cross. From the western slopes the Karun descends to Mesopotamia, and is navigable for a considerable distance. In the south the

ranges become lower and begin to trend east. Bushire and Bandar Abbas are ports on the hot sandy coastal strip at their base, barren except for occasional groves of date palms. From these ports difficult routes cross the mountains to the interior. That from Bushire passes by Shiraz and the site of Persepolis, the capital of ancient Persia.

East of the Kurdistan and Zagros Mountains is a high broad valley, fertile where it can be irrigated. The largest town is Ispahan, in the midst of gardens and orchards irrigated by a mountain stream. Many famous art industries in woven fabrics, embroidery, and the working of precious metals, are carried on. East of this central valley rise other parallel limestone ranges, with Yezd and Kerman as route centres in the valleys which separate them. East of the limestone ranges are the vast salt and sand deserts of Eastern Persia, extending to the mountains of Afghanistan. Caravan routes of great antiquity cross the desert to the centres mentioned.

The Hindu Kush and Eastern Iran. East of the Persian desert the mountain barrier narrows to about 300 miles between Turan and the plains of Hindustan. It is, however, much higher and more inaccessible, culminating in the little known Hindu Kush (= slayer of Hindus), with peaks from 20,000 to 25,000 feet. The glaciers of the northern valleys feed the Oxus, which in its steep-walled upper course separates Afghanistan from the Russian protectorate of Bokhara. In the north-east the Hindu Kush is connected south of the Pamir plateau with the Himalayas and the mountains of Eastern Asia. It is made up of lofty ranges, radiating west and south towards Eastern Iran. The northern ranges are connected with the mountains of Khorasan; those of the centre form the mountains of Afghanistan, and in the south-east the limestone Sulaiman and Kirthar Mountains rise above the plains of the Indus, and sink in the south to the plateau of Baluchistan.

Routes between Turan and India. Of the Afghan ranges the most important is the Koh-i-Baba, in which rise the Kabul, flowing to the Indus, the Helmand to the depres-

sion of Seistan on the eastern margin of the Persian desert, and the Hari-Rud and Murghab, which dry up in the sands of Turan. The Koh-i-Baba is separated from the main mass of the Hindu Kush by the Bamian Pass (8,400 feet), a narrow defile, which forms the main route between Turan and Kabul. It was traversed by Alexander on his march to India. Kabul,

FIG. 54. The Mountains bordering North-west India. For names see Fig. 55 opposite.

the capital of Afghanistan, on the Kabul river, commands the Khaibar route into India, by which most conquerors except Alexander have passed. The lower course of the Kabul is too difficult to be traversed, and the route leaves it at Dhaka for the narrow defile of the Khaibar Pass. The Safid Koh and Sulaiman Mountains, rise to the south of this. This

defile, which is thirty-three miles long and in places only from ten to seventy feet wide, opens to the Peshawar plain of Northern India.

The second great route from Turan into India goes by Herat and Kandahar. Herat is in the centre of the broad

FIG. 55. The Mountains bordering North-west India. The Routes from Iran, Turan, and Eastern Turkestan should be traced on this figure and Fig. 54.

fertile valley of the upper Hari-Rud. The direct routes to Kabul are very difficult, but there is a regular caravan traffic with Kandahar, which lies in a fertile plain irrigated by canals from a tributary of the Helmand. Kandahar, named after its founder Alexander, commands the southern route into India

by Quetta, the capital of British Baluchistan, and the Bolan Pass (5,800 feet) to the middle Indus. This route will ultimately be followed by a railway. The British line from India is already carried beyond Quetta, and the Russians are pushing towards Herat by a branch from the Transcaspian.

Climate and Products. The high elevation of Iran, from which high mountains on every side exclude all rainy winds, is everywhere dry and extreme. Enough snow falls on the mountains to feed streams which almost without exception are lost in the desert. Their upper courses are utilized for irrigation by constructing underground channels, to prevent waste through evaporation. This partly explains the high elevation at which many towns are built (Ispahan and Kerman, 5,500 feet; Teheran, 4,000 feet; Kabul, 7,200 feet). When irrigated, the soil is very fertile, and fruits come to perfection (vine, orange, pomegranate, mulberry, apricot, peach, quince, plum, pear, almond, pistachio, walnut). The Persian roses are famous. Except in the irrigated areas Iran, if inhabited at all, is pastoral. The wool and hair of sheep, camels, and goats is made into famous carpets and shawls. Trade is chiefly by camel caravans, and roads hardly exist.

Historical Summary. Notwithstanding the difficulty of the routes across and out of it, the Iran plateau early became the seat of a great empire. Under Cyrus (about 550 B. C.) and his successors the hardy mountain warriors pushed their way by the routes described into the fertile lowlands beyond, reaching the plains of India in the south-east, and Mesopotamia, Asia Minor, Syria and Egypt in the west. From Asia Minor they crossed the Hellespont, and attacked Greece. Victory would have given them the command of the Eastern Mediterranean, but they were decisively defeated both on sea and land at the beginning of the fifth century B. C. A century and a half later Alexander extended his empire over Asia Minor and Iran, and into the marginal lowlands of Turan and the Indus. Parthians, Saracens, Turks, and Mongols were among the later conquerors. Whenever the power on the

plateau has been strong enough it has attacked the fertile plains of Hindustan. There has also been constant friction between east and west. The present state of Afghanistan became independent in the middle of the eighteenth century. Together with Persia, it separates the Asiatic territories of Russia and Britain.

FIG. 56. The Mountains and Plateaus east of the Pamirs. Cf. Fig. 51. The lowlands are left white, the lower plateaus are stippled, the mountain ranges and higher plateaus have a horizontal ruling, the highlands a horizontal ruling crossed by a slanting ruling, and the tablelands are stippled with a vertical ruling crossing them.

Mountains and Plateaus of Central and Eastern Asia. All the ranges from the west converge to the Pamir plateau (12,000 to 14,000 feet), where the mountain barrier contracts to about 500 miles between the valleys of the Syr Daria and Indus. From this centre ranges diverge eastwards so widely that the mountain belt attains its maximum breadth

of about 1,200 miles. Beyond this to the north lie the Central Asian Highlands. Including these, a region of mountains and plateaus nearly 2,000 miles broad separates the lowlands of the Yenisei from those of the Brahmaputra.

From the northern end of the Pamir plateau spring the Tian Shan ranges (24,000 feet), which form the northern wall of the Tarim basin. The Tian Shan are separated by the depression of the Zungarian Gate from the masses of the Central Asian highlands, the Altai, the Sayan, the Transbaikalian or Yablonoi highlands, and the Vitim and Aldan highlands, related to the Central Asian mountains as the Central European highlands (Schwarz Wald, Vosges, &c.) are to the Central European mountains. They form the northern margin of the plateau of Mongolia (3,000 to 4,000 feet), which descends in the east by the steep escarpments of the Khingan Mountains and the Shansi highlands to the lowlands of Manchuria and Northern China.

South of the Tarim and Mongolian plateaus rises the still higher plateau of Tibet (12,000 to 16,000 feet), bordered on the north by the lofty Kwenlun ranges (22,000 feet), which run east from the Pamir plateau. Between the Kwenlun and the Himalayas are the Karakorams, continuing the line of the Hindu Kush, and separating the rivers flowing to the Indian Ocean from those flowing to basins of inland drainage. The highest peak, Mount Godwin-Austen, exceeds 28,000 feet, the passes are from 18,000 to 19,000 feet high, and the glaciers are the largest in the world outside the polar regions.

The Pamir Plateau. On this plateau or its margin rise the Syr and Amu, flowing west to Turan, and the Kashgar and Yarkand, which flow east and unite to form the Tarim. Difficult routes across high passes connect the Ferghana valley with Kashgar, the chief centre of the Tarim basin. Two other important rivers rise near the Amu and Yarkand, (1) the Chitral tributary of the Kabul, connecting the Tarim with Afghanistan south of the Pamir plateau, and (2) the Gilgit tributary of the Indus, which forms a difficult route between Kashmir and the

Tarim. Finally, the southern and main branch of the Yarkand rises close to the Shyok tributary of the Indus, and a difficult route over high passes crosses the series of parallel ranges and valleys which separate Leh, on the Indus, from Yarkand, the southern centre of the Tarim. The Pamir plateau thus controls routes in all directions. Four powers, approaching it by four different routes, here converge—Russia, by the Amu and Syr valleys ; China, by the Tarim and Tibet ; India, by the Indus and its tributaries ; and Afghanistan, by the Upper Amu and the valleys of the Hindu Kush. The Pamirs are broad, level, glaciated valleys, 12,000 to 14,000 feet above the sea, separated by mountains several thousand feet higher. They are above the tree-line, but afford good pasture in summer. For several months in the year they are buried in snow.

The Northern Plateaus. The Tarim basin, or Chinese Turkestan, between the Tian Shan and Kwenlun, is a high, arid plateau, with an extreme climate and some fertile oases at the opening of the mountain valleys, where irrigation is possible. Hami, Turfan, Aksu, and Kashgar lie at the southern base of the Tian Shan ; Cherchen, Khotan, and Yarkand at the northern base of the more arid Kwenlun. There are many salt lakes, in the largest of which, Lob Nor, the Tarim ends. Most of the basin is a desert of shifting sand, whose advance has buried once prosperous cities.

Between the Tian Shan and Altai is the lower plateau of Zungaria, where the rivers disappear in lakes and marshes. Two routes lead out of it, one by the Zungarian Gate to Lake Balkash, one by the Irtish to Semipalatinsk. Urumtsi is the largest of the oases along the northern base of the Tian Shan, and Kulja is the chief place in the Ili valley, reached from the Tarim basin by the Musart pass across the Tian Shan. Mongolia (1,300,000 square miles) rises gradually from Zungaria, and is separated from the Tarim basin by a line of higher ground. In the north it rises to the Central Highlands, from which (1) the Selenga flows to Lake Baikal, and thence as the Angara to the Yenisei, and (2) the Shilka to the Amur. In the

south it is crossed by the great loop of the middle Hwangho, which surrounds the Ordos desert. Enclosed on all sides by high mountains, Mongolia has a dry extreme climate. Much of it is desert, as in the Gobi or Shamo. The rest is poor steppe. The inhabitants are wandering pastoral tribes. Urga, the only important town, is the northern capital of the Buddhist faith.

Routes across the Northern Plateaus. Across these desert plateaus the routes are followed from oasis to oasis by camel caravans. The ancient jade route starts from Kashgar, and goes by Yarkand and the oases at the northern base of the Kwenlun to the Hwangho, which it crosses at Lanchou, where the river leaves the Tibetan plateau. This route was followed by Marco Polo in the thirteenth century. Another route follows the oases south of the Tian Shan to Hami, where it crosses the desert at its narrowest and least arid part, and joins the southern route at the western end of the Nan Shan, an outlier of the Kwenlun. The third route is by Zungaria, on which no passes need be crossed to reach the Mongolian plateau from the steppes. This goes through Urumtsi and the other oases north of the Tian Shan, and joins the second route at Hami.

The route from Siberia to China is from Kiakhta, south of Lake Baikal, by Urga across the desert to Kalgan, where the descent begins to Peking and the plains of North China.

The Northern Plateaus in History. Northern Mongolia has always been the home of nomadic tribes, who, as population increased, trekked off in great swarms, with their families and their animals, to seek new homes. Accustomed to the saddle, to tent life, and to simple fare, they proved very formidable when they came in conflict with settled agricultural peoples. The early middle ages saw a great outburst of Mongol energy under a succession of capable leaders. Genghiz Khan, early in the thirteenth century, established his permanent camp at Karakoram, in Northern Mongolia, now buried in the sands. He overran much of China, and pushed his way

west by Zungaria to the oases of Turan and the routes leading from them. Following the richer steppes, the Mongols reached Hungary and Moravia in the middle of the thirteenth century, and overran Russia. A number of centres of Mongol power were thus formed, often hostile to each other. Another great wave of conquest occurred in the following century, when Tamerlane, whose capital was at Samarkand, reached the Mediterranean and the Ganges. In the sixteenth century Baber, a descendant of Genghiz Khan, invaded India, and founded the Mogul Empire. The Mongols conquered rapidly owing to their extreme mobility, but they failed to make lasting conquests because they are not, like agricultural people, rooted to the soil. The latter have always, after an interval, either absorbed them or beaten them back to the poorer steppes, where their mode of life suits the geographical conditions. Thus the Chinese in the fifteenth century drove them out of China and across Mongolia to the Altai, making Mongolia a Chinese province. A century or so later Russia began to push them east once more. A peaceful invasion is now in progress. Chinese farmers are settling in the valleys leading up to Mongolia. Another stream of colonization has gradually crept across the desert to the Ili valley, where Chinese are numerous. At the same time, Russian settlers are gradually pushing in from the north.

The Southern Plateau. The high passes of the Kwenlun lead to Northern Tibet, a high, bleak, uninhabited region of parallel mountains and valleys, swept by icy gales at all seasons. In the east these parallel ranges begin to trend east and south. They are separated by inaccessible and unexplored gorges, filled by the upper tributaries of (1) the Hwangho, which soon turns north and east, (2) the Yangtsekiang, which also eventually flows east, and (3) the Mekong and Salwin, which flow south between the ranges of the mountainous peninsula of Indo-China. The South China highlands lie south of the Yangtse, but are not a continuation of the Central Mountains. The southern margin of Tibet is formed by the great range of

the Himalayas, which rise to about the height of the Alps above the Tibetan plateau, but sink on the south for 20,000 feet or more to the plains of Hindustan. Near the middle of the range, between the Central and Tibetan ranges, the Indus and the Sanpo, or Brahmaputra, rise near each other, but flow in opposite directions. After a course of several hundred miles, each begins to break south through the parallel ranges in inaccessible gorges, reaching the plains of Hindustan at points nearly 2,000 miles apart.

Only Southern Tibet is permanently inhabited. It contains some level valleys opening to the Sanpo, and intermont plains, like that in which Lhasa, the capital and centre of the Buddhist faith, is situated. Notwithstanding the extreme climate, these valleys are cultivated under irrigation with cereals, pulses, peach and apricot. The Tibetans are a pastoral people. Among their domesticated animals is the yak, a species of ox, used as a beast of burden on the higher passes. In the few village towns some artistic handicrafts are practised, including skilful work in gold, silver, and turquoise, all found in the mountains.

The routes across Tibet cross wide, uninhabited tracts by numerous high and difficult passes. The tea route is by Tachienlu, on the south-eastern margin of the plateau, where the brick tea is transferred to yaks. The rest of the Chinese trade follows the Wei tributary of the Hwangho by Lanchou and Sining, in the north-east. Both these routes converge on Lhasa, from which they either continue to Leh, on the Indus, for Kashmir or Turkestan, or descend by the passes of the Himalayas to Sikkim, Nepal, and Bhutan.

The Himalayas. The total length of the Himalayas depends on the limits we give to the name, but it is generally reckoned at about 1,500 miles eastwards from the transverse valley of the Indus. The system is broadest in the west (250–300 miles), and narrowest in the east (150 miles). The average height of the higher ranges is about 16,000 or 18,000 feet, but at least forty summits exceed 24,000 feet.

Many of the passes are not far under 17,000 feet. The highest in use is over 20,000 feet.

The Himalayas consist of parallel ranges with high valleys between. The main Himalayan chain, also called the Central or Snowy Himalayas, is south of the Indus and Brahmaputra valleys, and contains all the highest summits, Nanga Parbat (26,600 feet) in Kashmir, Nanda Devi (25,600 feet) in Tibet, Dhaulagiri (26,800 feet), Everest (29,000 feet), and Kanchenjunga (28,000 feet) all in Nepal. North of this Central chain and of the Indus and Brahmaputra valleys are the lower,

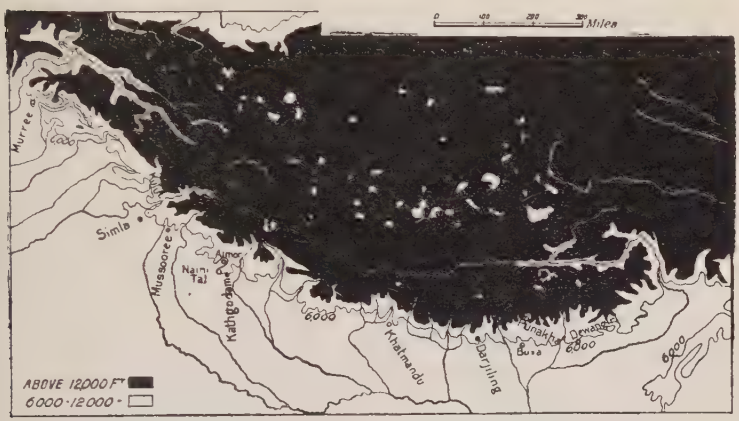


FIG. 57. The Himalayas, showing the chief hill-stations. The white patches on the Tibetan plateau indicate lakes.

more arid Tibetan or Trans-Himalayan ranges. South of the main or Central Himalayas are the lower Sub-Himalayan ranges, with the vale of Kashmir enclosed between them and the Central range in the north-west. Beyond these again to the south are the foot-hills, bordered by the marshy malarial *terai*, covered in the east with rank jungle. The southern slopes of the Himalayas receive heavy rains in the east and centre, where landslips and mud avalanches often do great damage. The vegetation is tropical up to 3,000 feet, deciduous to 7,000 feet, and evergreen (pines

and cedars) to 12,000 feet. Above this the trees become stunted and pass into pastures, which become poorer towards the snow-line (between 16,000 and 17,000 feet on the Indian slopes). Between 7,000 and 8,000 feet in the Sikkim Himalayas brilliantly coloured rhododendron forests contrast with the glittering snow-peaks beyond. In the north-west the rainfall is less, and in Kashmir the forests are denser on the northern than on the southern slopes, as the snow lies later into the summer, and the summer heat is less.

All the great rivers of the Himalayas rise between the

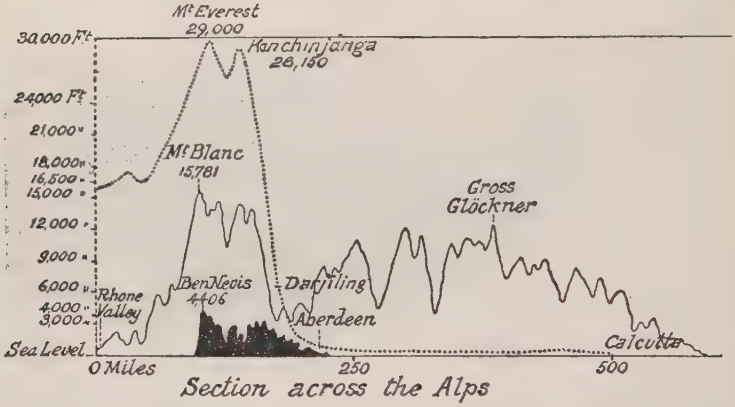


FIG. 58. Comparative sections of the Himalayas, Alps and Scottish Highlands. Note that the section is *across* the Himalayas but *along* the Alps.

Tibetan and the Central Himalayas. The sacred Manasarowar lake, south-east of Kashmir, is near the headwaters not only of the Indus and Brahmaputra, but also of the Gogra, the longest of the feeders of the Ganges, and from it flows the Sutlej, one of the great feeders of the Indus. The Sutlej, after a course parallel to that of the Indus, breaks through the southern ranges in deep forested gorges north-west of Simla, the hill-station of the Punjab.

The southern slopes of the Himalayas are under divided control. Kashmir in the north-west, between Afghanistan and Tibet, stretching north to the Karakorams and the frontiers

of Chinese Turkestan, is under British control. It is a land of high mountains and deep river gorges. The most fertile part is the vale of Kashmir (5,000 feet), the level valley of the upper Jehlam, flowing to the Wular lake, near which is Srinagar the capital. From the hair of its goats are made the famous Kashmir shawls, and perfumes are distilled from its roses. Difficult routes by the Sind tributary of the Indus lead to Leh in Ladak, in arid surroundings, where the Indus valley widens. East of Kashmir, the provinces of Garhwal and Kumaon are included in the North-west Provinces. Nepal, with magnificent mountain, gorge, and forest scenery, but few accessible routes, is independent. Sikkim, with the hill-station of Darjiling, commands the Chumbi valley and other routes to Lhasa, from which its northern frontier is only about 150 miles distant. East of Sikkim is the independent native state of Bhutan, between the Central Himalayas and the Lower Brahmaputra. In the extreme east is Assam traversed by the Brahmaputra which comes from Tibet through inaccessible gorges and joins the Ganges delta. Beyond this the southern trend of the Himalayan ranges becomes very marked.

The topography of the Himalayas is so complicated, and the passes on the main routes so numerous, that they cannot be enumerated. The chief routes between north and south and east and west cross Kashmir, and many converge on Leh.

THE SOUTHERN AND EASTERN MARGINS OF THE CENTRAL MOUNTAINS.

The Central Mountains occupy nearly half of Asia. Not only do they make communication difficult for man, but they form a barrier to plants and animals. The Indian elephant, the rhinoceros, the tiger, and the ape appear on the farther or oceanic margin, and teak and spices are among the new plants. Asia, however, has long been the home of highly-civilized races, with extensive trade relations. This has led

to an interchange of domesticated plants and animals, which partly disguises the contrast between the marginal regions on opposite sides. This contrast is most marked where the barrier is widest, as between Siberia and India.

FIG. 59. The Marginal Lowlands and Islands of Eastern Asia.

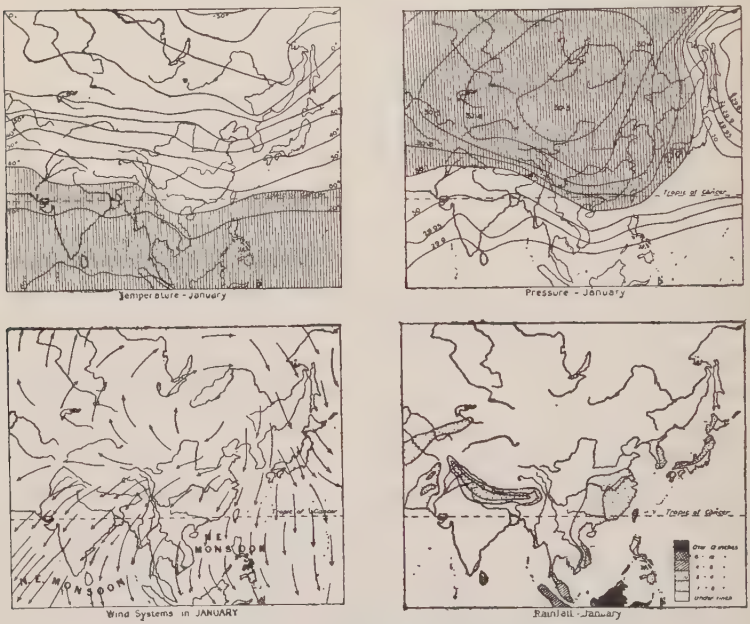
The Marginal Lowlands. The Central Mountains reach the sea in Iran, in Indo-China, in South China, and round the Sea of Okhotsk. Between these mountain buttresses lowlands open to the sea. Beginning from the west they are (1) Mesopotamia, the broad plains of the Lower Euphrates and Tigris, opening to the Persian Gulf between Iran and the Arabian tableland (the latter geographically part of Africa); (2) the Indus lowland, opening to the Arabian Sea between the Sulaiman Mountains and the Deccan tableland of Southern India; (3) the Ganges lowland, opening to the Bay of Bengal between the Himalayas and the Deccan; and (4) the Indo-Chinese lowlands opening to the Indian and Pacific Oceans—(*a*) the Lower Irawadi and Salwin, forming Lower Burma, (*b*) the Lower Menam, forming Siam, (*c*) the Mekong, forming Cambodia, and (*d*) the Songkoi or

Red River, forming Tongking. In China are (5) the narrow lowland of the Sikiang, separated from (6) the vast lowlands of North China which extend inland up the Yangtsekiang and Hwangho to the base of the Central Mountains. They are separated by the Manchurian Highlands, a continuation of the Shansi Highlands from (7) the lowlands of Manchuria and Amuria, at the base of the Khingan Mountains. Manchuria is drained north to the Sea of Okhotsk by the Amur and its tributaries, but there is an extremely important opening in the south to the Yellow Sea by the Liaoho, between outliers of the Khingan Mountains and the mountains of Korea, which with the Tatar mountains shut off Manchuria from the Japanese sea and deflect the Amur north. By this route Russia reached the ice-free Port Arthur, since lost to Japan.

Eastern Asia is bordered by a chain of volcanic islands defining marginal seas; the Okhotsk Sea, between Kamchatka, the Kurile Islands and Sakhalin; the Japanese Sea, between Japan and Korea; the East China Sea, between Korea, the Luchu Islands and Formosa; and the South China Sea, formed by the Philippines, Borneo, and the Malay Peninsula. The islands and seas of Malaysia stretch eastwards towards Australia. The marginal Andaman Sea, west of the Indo-Chinese Peninsula, is enclosed by the Andaman and Nikobar Islands and Sumatra, the latter separated by the Malacca Strait from the Malay Peninsula. The mountains of Sumatra are continued by those of Java and the Sunda Islands, the whole forming a spur of the Central Mountains extending far south of the equator.

The Monsoons. Notice that these lowlands are isolated from each other by mountains and seas, and that there are no easy land routes between them. Each has thus developed a characteristic civilization. Excluding the islands within 10° of the equator, a general similarity results from the monsoons, the influence of which is most marked between the Hwangho and the Indus.

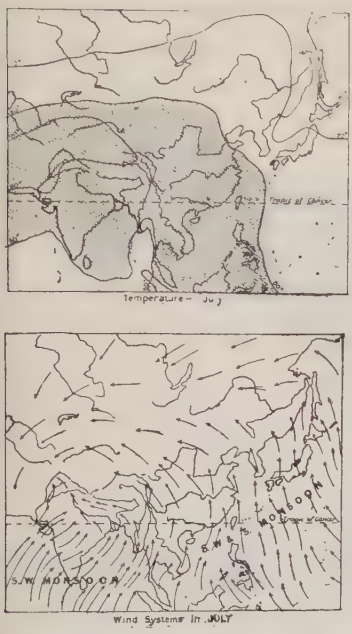
The difference between the heating capacity of sea and land in summer and winter has already been explained (see *Jun. Geog.*, pp. 25–31). From North China southwards the average July temperature is at least 80° F., with much higher maxima. The air over the land becomes intensely heated, expands, becomes lighter, and rises, forming what is known as an area of low air pressure. Over the sea, where the



FIGS. 60-63. The Monsoon Lands. Atmospheric conditions in January. Notice how the Himalayas and Tibet act as a barrier, and how the cold winds blow out from the lower plateaus of Eastern Asia over the eastern margin in this month. Notice the areas of winter rains.

temperature is lower, the air is not so expanded, and forms an area of higher air pressure. As the heated air over the land rises, cooler, moister air is drawn in from below from over the sea, causing inflowing winds and summer rains. In winter the conditions are reversed. The isotherm of 32° F. crosses Asia between the Yangtse and the Hwangho. The winter tempera-

ture of South China and Northern India is between 50° and 60°. The air over the land is colder than over the sea, and blows outwards as cold, dry winds, from the north-east in the south, and from the north-west in the east. These summer and winter winds blow with great regularity and are called monsoons, from an Arabic word meaning seasons. The great mountains and plateaus of Central Asia rise above the lower



FIGS. 64–67. The Monsoon Lands. Atmospheric conditions in July. Notice how the Himalayas and Tibet again act as a barrier and deflect the SW. wind to a SE. wind blowing up the Ganges basin. Pay special attention to the centre of low pressure and the winds blowing round it. Compare both of these with the rainfall.

atmosphere to which these movements are confined and divide the Indian from the East Asiatic monsoon area.

The characteristic feature of the monsoon climate is the regular summer rains, which occur from Manchuria to the Indus. Mesopotamia, on the Mediterranean margin, is practically rainless, receiving its waters from the snows of Armenia.

The regularity of the seasons is favourable to agriculture, since it is easier to provide against drought recurring at stated intervals than against deficiency or excess of rain at irregular intervals. This has made the Asiatic monsoon area the most densely peopled in the world, as can be seen from Fig. 68. The regularity of the winds has promoted intercourse by sea, though typhoons and cyclones are common at the change of monsoons.

Historical Summary. Except in Manchuria, an agri-

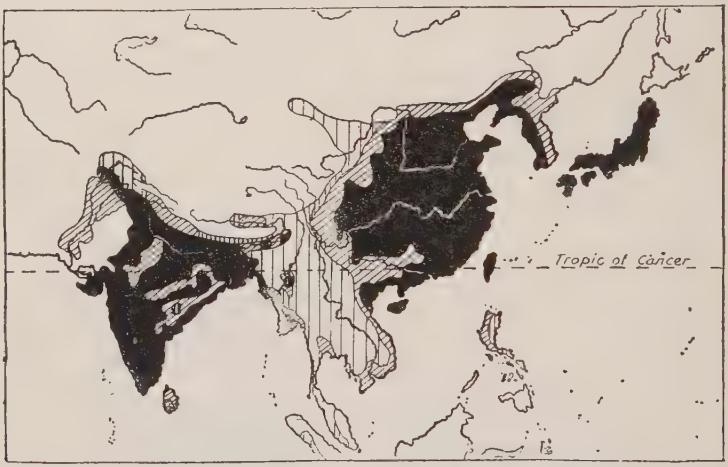


FIG. 68. Density of Population in the Monsoon Lands. White below 15 to the square mile, vertical ruling 15 to 50, slanting ruling 50 to 100, black over 100. Compare the limits of the areas with less than fifteen people to the square mile with orographical and rainfall maps. Figs. 56, 59, 63–64.

cultural civilization early developed. Outside influences have come either across the mountains or from overseas. Mesopotamia was the seat of the great Assyrian civilization with Nineveh as its capital, and of the Chaldaean Empire, with Babylon. It is the most vulnerable of the lowlands, being exposed to attack from the Arabian and Iranian plateaus, from the Persian Gulf, the Mediterranean, and even from Egypt. It has thus had many vicissitudes, the most fatal being its conquest by a pastoral people (the Ottoman Turks),

who neglected irrigation and closed the trade routes. The Indo-Gangetic lowlands have been repeatedly invaded from the north, and are now ruled by British invaders from overseas. It is almost impossible to attack the Indo-Chinese lowlands across the mountains, but they are very vulnerable by sea. In China civilization has followed the old jade route, which early brought China into contact with Mesopotamia. Intercourse with Europe in the Middle Ages followed the same route and was also carried on by sea. Marco Polo originally went to Ormuz, at the head of the Persian Gulf, intending to proceed by sea. Invasions of China from the steppes and deserts to the north-west have always been destructive of civilization. They led to the building of the Great Wall in the third century B.C. The last conquest was made by the Liao lowland in the seventeenth century, setting the present Manchu dynasty on the throne. Russia threatened China by the same route, but has been recently checked by Japan.

AMURIA AND MANCHURIA.

The Amur rises as the Shilka and Argun in the Mongolian plateau, and descends between the Khingan and Aldan Highlands to Amuria, the Russian part of the Amur lowland. From Manchuria, the Chinese portion, it receives the Sungari, from the Manchurian Highlands, which forms part of the route south by the Liao valley. The Amur forms a navigable route from the plateau to the Okhotsk Sea, but its port, Nikolayevsk, is icebound for many months in winter. The main route is by the Usuri to Vladivostok, on a fine harbour, open for nine months of the year.

Amuria has a severe climate. Much of it lies in the northern forest zone, which supplies timber and furs. The fertile valleys are cultivated with cereals. Gold mining is important in the valleys of the tributaries from the north, especially in that of the Zeya, near the confluence of which is the capital, Blagovyeshchensk.

Manchuria is a dry steppe in the west, but the east receives a fair rainfall. The climate is extreme, varying from 90°, or more, in summer, to several degrees below 0° in winter. The great mineral resources, which include gold, copper and lead, are as yet hardly utilized. A century of Chinese colonization has developed the natural fertility of the country. Millet (a

FIG. 69. Amuria, Manchuria, Korea, and Japan. The shaded lands are highlands.

giant variety), wheat, pulses, drugs (rhubarb, ginseng) are among the crops. The capital is Mukden, and the port is Niuchwang, both in the Liao valley.

The Siberian line crosses Manchuria to Vladivostok, sending a branch south from Harbin, by Mukden, to Niuchwang and Port Arthur, at the end of the Liaotung peninsula, leased by

Russia from China in 1898. Port Arthur, which is ice free, commands the entrance to the Gulf of Pechili, and the approach to Peking by sea. During the Chinese disturbances of 1900 Russia occupied the Liao valley, and as this threatened the other countries round the Yellow Sea, a war with Japan followed, in which Russia lost Port Arthur and the footing gained in Manchuria.

KOREA.

Korea is a mountainous peninsula, sinking steeply to the Pacific. The lowlands open to the Yellow Sea. The climate is extreme. The rains fall during the summer monsoon. The mountains are forested, with clearings in which the hardier cereals are grown in the north. The southern crops include wheat, millet, pulses, ginseng, tobacco, hemp, cotton, &c. Gold is abundant, and many concessions have been granted to foreign syndicates. Though the natural routes open towards China, Japanese influence predominates. A line runs from Fusan, the Pacific port opposite Japan, by the capital, Seoul, and Chemulpho, the Yellow Sea port, across the Yalu into Manchuria.

CHINA.

North China. North China consists of the lowlands of the Hwangho, which rises in the heart of the Tibetan plateau, and descends between the highlands of Shansi and Shensi from Mongolia. The direct and historically most important route from the Mongolian plateau is by the Wei tributary, which flows along the northern base of the Tsingling Mountains, a continuation of the Kwenlun. The routes from Kulja, Kashgar, and Yarkand converge on Singan, the chief commercial centre of Shensi. After receiving the Wei the Hwangho is deflected in an easterly direction by the Tsingling Mountains, which separate it from the Yangtse.

The lower course of the Hwangho crosses the yellow loess basin of Northern China. The valleys and hills are covered with a deep, porous yellow soil of great fertility, derived from

the arid plateaus to the west, where the loose dry surface soil, unprotected by vegetation, is easily caught up and carried by wind. The loess region consists of a series of basins, depressed in the centre, the rims representing the original mountain ranges. Each of these basins has its fortress capital in the centre. Rivers and roads are cut deeply down through the

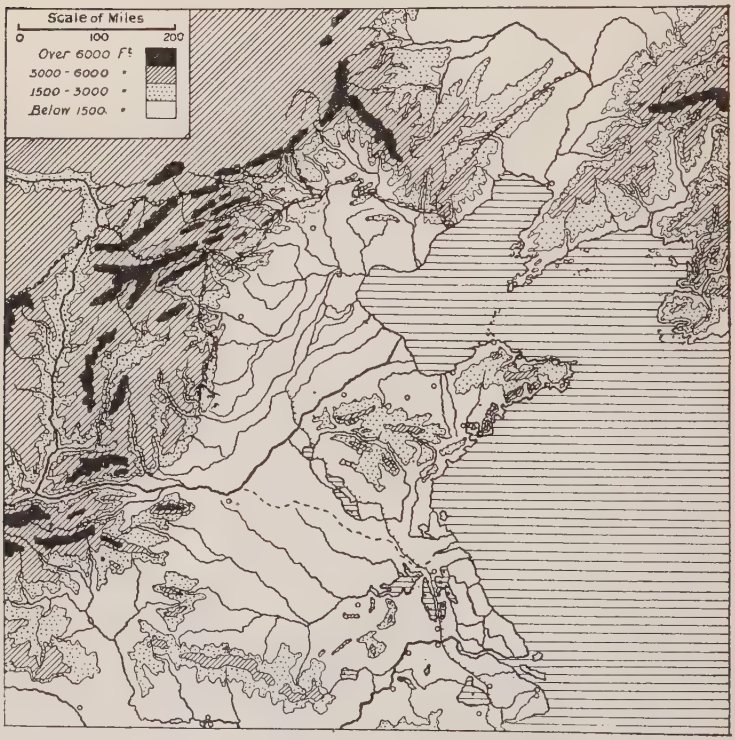


FIG. 70. Northern China, showing the relief of the land. Cf. Fig. 71.

porous soil, rendering communication difficult and irrigation impossible. Beyond the loess districts are the alluvial lands round the Gulf of Chili, formed of sediment carried down by the river into the shallow gulf, which it is rapidly silting up. Here the river is embanked to prevent floods, and is forced to deposit much of its sediment on its own bed, which is thus

gradually raised above the level of the surrounding country. The embankments give way periodically, and thousands of square miles are inundated. As the water subsides the river finds a new course to the sea. Its present mouth is north of the mountainous Shantung peninsula, and 400 miles distant

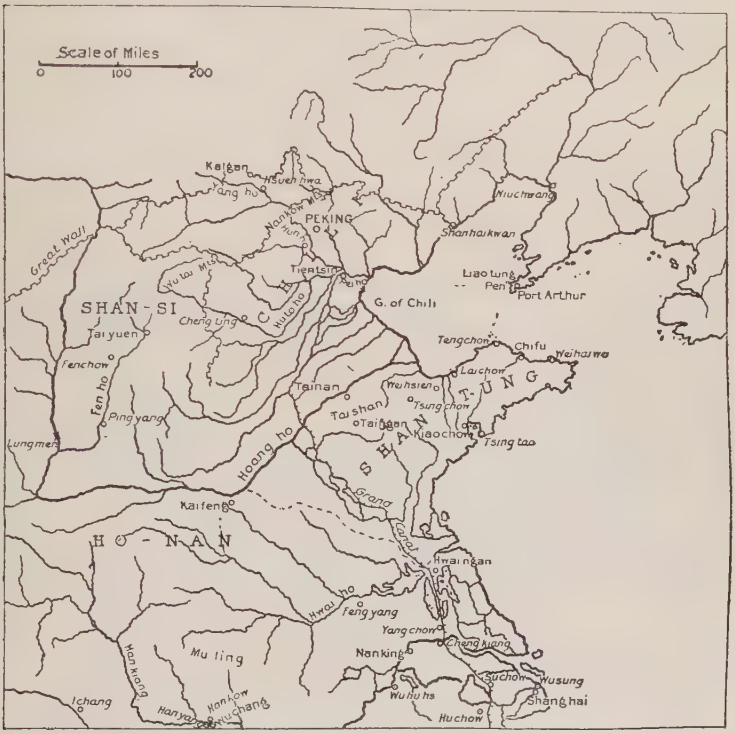


Fig. 71. Northern China. Chief Towns. Cf. Fig. 70.

from that by which it reached the sea south of the peninsula in 1851.

The climate is extreme. The severity of the winters is intensified by easterly gales from Mongolia. The chief crops are barley, millet, wheat, maize, cotton, tobacco, and hemp. Rice is not grown north of the Tsingling. Shansi possesses inexhaustible deposits of coal (bituminous and

anthracite) and iron, and as communication develops will become a great industrial region.

The Hwangho is not an important route, as it is too swift for navigation. There are no ports on the sandy Chili Gulf, but on the Shantung peninsula are Chifu, Weihaiwai (Brit.) and Kiaochou (Germ.). A railway runs from Kiaochou to the Hwangho at Sinan. The chief port of Northern China is Tientsin, on the Peiho. Lines run to Manchuria in the

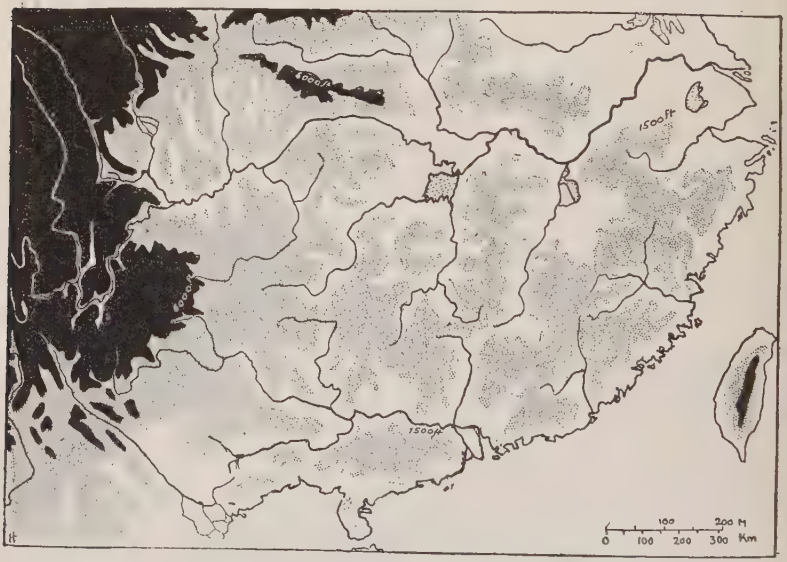


FIG. 72. The Physical Features of Central and Southern China. Cf. Fig. 73.

east, and north-west to the capital, Peking, which is built where the route from Mongolia enters the plains. From Peking a line runs south, parallel to the base of the Shansi Highlands, crosses the Hwangho near Kaifeng (now twenty miles south of the river and twenty feet below its level), where the river finally leaves the mountains, and is continued south to the Yangtse at Hankow.

The fertility of the loess districts long confined the Chinese

to the Hwangho basin. Access to the Yangtse basin was rendered difficult by the forested mountain ranges of the Tsingling, but was possibly accelerated in the end by the steady pressure on Northern China of invaders from Mongolia.

Middle China. The Yangtse, unlike the Hwangho, affords a magnificent route from the sea to the interior. It rises in Tibet, is deflected east by the highlands of Yunnan, and takes a north-easterly course across the mountainous pro-

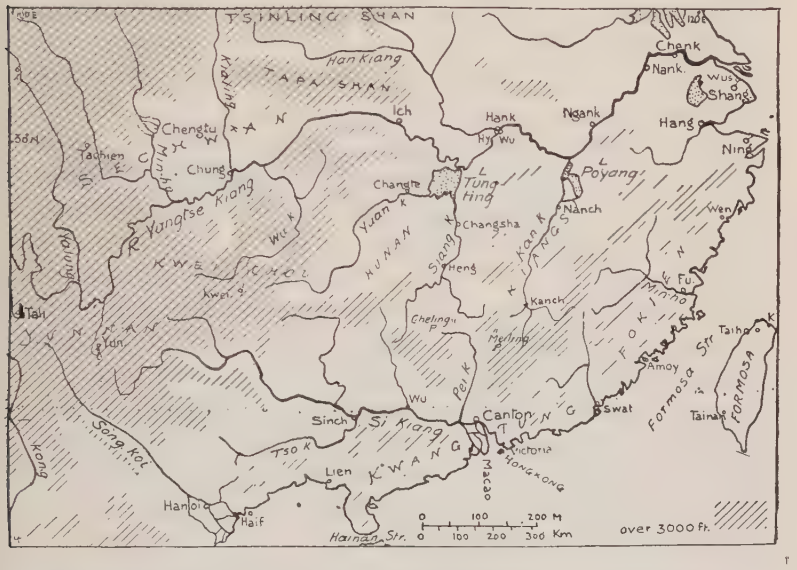


FIG. 73. Routes and Towns of Central and Southern China. Cf. Fig. 72.

vince of Sechwan, whose fertile 'Red Basin' vies with the 'Yellow Basin' of Northern China in fertility. Sechwan is as large as England, with an extreme climate and a fair rainfall. Its rivers are fed by the snows of Tibet, and the harder rock makes irrigation possible. This is carried out on an elaborate scale on the Chengtu plain (2,500 feet), crossed by the Min, a left bank tributary from Tibet. Spade agriculture and terracing, which is carried to the height of several thou-

sand feet, are the laborious methods by which the land is enabled to support its dense population. Rice, wheat, maize, pulses, opium, indigo, sugar, hemp, tobacco, drugs, and mulberries are grown at varying elevations. Tea is extensively grown on the hills. Coal and iron occur together over large areas. The precious metals and copper are abundant on the margin of the Tibetan plateau. The port of Sechwan is Chungking, at the confluence of the Kialing, near the western entrance to the Yangtse gorges through the Sechwan Highlands. Below Ichang, at the eastern exit, the river is navigable for 900 miles.

The Han, from the Tsingling, forms an important route from north to south. The triple city of Hankow-Hanyang-Wuchang, at the confluence, is a great commercial centre. On the right bank the Yuankiang and the Siangkiang, from Hunan, a province rich in iron and anthracite coal, reach the river across the sandy flats of Lake Tungting. Lower, the Kan enters across the Poyang lake. These lakes act as reservoirs when the river is high during the summer rains. A rise of 70 feet is not exceptional, and the floods which result, though temporarily disastrous, greatly increase the fertility of the soil. The lower basin of the Yangtse supplies tea, rice, and silk, and is crowded with large towns. The port is Shanghai, the outlet and route centre for the richest provinces of China. The Yangtse brings down vast quantities of sediment, and is gradually silting up Shanghai harbour.

The Chinese did not penetrate into the Yangtse basin for nearly 3,000 years after the settlement of Northern China. Once reached, its fertility and excellent water communication made it the centre of wealth and population. In the basin of the Lower Yangtse are the old capitals of Nanking and Hangchou (Kinsay), the latter the capital at the time of Marco Polo's visit. Peking, in North China, only became the capital after the Mongol conquest in the latter part of the thirteenth century.

Southern China. The east coast has many excellent

harbours, but the interior consists of highlands. Rice, tea, and silk are the chief products. Fuchou in Fukien is the chief port. Population is in excess of the capacities of the region, and there is much emigration to various parts of the Pacific.

South China is mountainous, rising through the South China Highlands to the plateau of Tibet. Yunnan and Kweichou are inhabited by many aboriginal tribes, at a low stage of culture. The natural resources of both provinces are great, including almost every kind of mineral wealth. They were depopulated in the civil wars of half a century ago, and roads have fallen into disrepair, increasing the natural difficulty of communication. There are proposals for connecting Yunnan by rail with Burma. The ancient trade route went from Talifu, the western capital of Yunnan, to Bhamo, on the Irawadi, but the many wide gorges and parallel mountain ranges to be crossed, make this a difficult route for a railway. A French line is being made to Yunnan the eastern capital, from Tongking.

The forests of Southern China supply camphor, spices, and many valuable woods. Yunnan is a limestone plateau, with fertile sunken basins, in which opium is grown. Rice is a heavy crop in the broad valley bottoms of the Sikiang and its tributaries. The coastal province of Kwangtung, with a rich soil and a tropical climate, produces rice, silk, sugar, opium, indigo, tea, oil seeds, and many fruits.

The Sikiang is the chief waterway of Southern China. Its port is Canton, on the most navigable of the distributaries, where the route from the west by the Si, and that from the north by the Pe, converge. The island of Hongkong (capital Victoria) is British, as are Kaoling and Mirs Bay on the opposite mainland. The southern margin of South China is a region of tropical forests, which also cover the little-known island of Hainan.

THE JAPANESE EMPIRE.

Japan and Eastern Asia. Japan is less closely connected with Eastern Asia than appears at first sight. Between it and the populous lowlands opening to the Yellow Sea the seas are wide, and where the straits are narrow they separate regions which are only sparsely peopled. Thus, while Japan has shared the civilization of China, which reached it by Korea, it has been sufficiently isolated to develop an independent nationality. In this respect it may be compared with Britain, which is similarly, but more closely, related to the continent of Europe.

Configuration. The Japanese Archipelago extends from the south of Kamchatka, in the latitude of London, to Formosa, which is crossed by the northern tropic. The main islands, Hokkaido or Yezo, Honshiu, the largest, Shikoku, and Kiushiu, lying between 30° and 45° N., sink in the west to the Sea of Japan, and to the deep Pacific in the east.

All the Japanese islands are mountainous, with numerous small isolated lowlands. In Hokkaido the valleys radiate outwards from a mountain centre (8,000 feet), to which converge ranges continuing the mountains of Sakhalin and of the Kurile islands. There are several active volcanoes. In northern Honshiu the valleys run north and south, and the same direction is seen in the peninsulas and bays, the largest of which is Tokyo. The island is crossed from north to south by a rift valley, on the margin of which are the principal volcanoes, including the dormant Fujisan (12,400 feet) and the active Asamayama (8,200 feet). From this rift valley the feature-lines run east and west in two belts, the northern forming the western prolongation of Honshiu, and the southern the Kii peninsula and the islands of Shikoku and Kiushiu. The rivers are short, swift, and often interrupted by falls, so that they are rarely navigable, and do not serve to connect the lowlands with each other. During the summer they frequently flood the lowlands, and render communication almost

impossible. Before the introduction of railways communication between lowland and lowland was chiefly by sea. The Inland Sea, or Japanese Mediterranean, separating Honshiu from Shikoku and Kiushiu, though difficult of navigation owing to the strong currents in the narrow straits leading to it, and to the many islands and rocks, has contributed to the unity of Japan, by connecting the lowlands of the most fertile part of the empire.

Climate and Products. With its great extension from

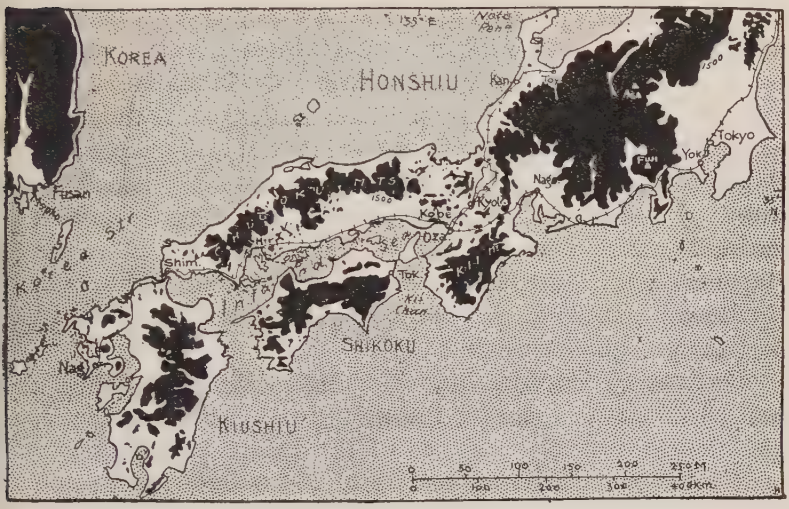


FIG. 74. Surface Features and Chief Routes of Southern and Central Japan.

north to south Japan has a climate ranging from sub-arctic to tropical. The western shores, along the Sea of Japan, have an extreme climate resembling that of North-eastern Asia. The high latitude and the cold north-west winds from Siberia make the winter climate of Hokkaido extremely severe, and snow lies long. The eastern, or Pacific coast is protected from these continental influences by high mountains, and has a more equable climate. In Shikoku and Kiushiu the winters

are mild and the summers hot. The climate of Formosa is tropical.

All over Japan the rainfall is heavy, the lands round the Inland Sea receiving least. Snow falls abundantly in winter in Hokkaido, and occasionally in the other islands of Japan proper. In the monsoon area, south of about 37°, the heaviest rains are in June, at the rice-planting season, when they are specially valuable.

Hokkaido and Northern Honshiu are forested, with few clearings. South Honshiu, Shikoku, and Kiushiu are agricultural, with forested highlands. Rice is the chief crop, as in all monsoon lands. After it is harvested the wet fields are planted with wheat, barley, or rape as winter crops. Beans are largely grown. Tea, introduced from China more than a thousand years ago, is the second staple, though the output is decreasing. Mulberries are grown in plantations, and as boundary and shade trees. Japanese silk has long been famous. Less important crops are indigo, cotton, hemp, flax, tobacco, and sugar. Japanese agriculture, like Chinese, is laborious and frugal. In the valleys it is carried to the height of 7,000 or 8,000 feet and the plough is not used.

Centres of Population. The centres of dense population are (1) round Tokyo, with the northern port of Yokohama; (2) along the northern shores of the Inland Sea, especially round the manufacturing centres of Kobe and Ozaka; and (3) in western Kiushiu, round Nagasaki, the southern port.

Coal and iron are found, but not together. The richest coalfields are in Hokkaido and Northern Kiushiu. Kaolin clay is abundant, and Japanese porcelain is famous. Many other art industries (lacquer, embroidery, enamelling, &c.) are of great antiquity. All forms of modern industry have been introduced during the last half-century, centring round Kobe and Ozaka, where cotton and steel are manufactured.

The isolated glens and plains of Japan favoured the growth of strong clan feeling under powerful feudal barons, against whom the central power was often powerless. Kyoto was

the old political and religious capital, and the residence of the semi-divine Mikado. The influence of the clans led to the concentration of military and administrative power under a Shogun, whose capital was at Tokyo, then called Yeddo. The last clan which held the Shogunate introduced the policy of refusing foreign intercourse in the seventeenth century. This isolation broke down in the middle of last century, when the United States insisted on commercial relations. Internal convulsions ended in the abolition of the Shogunate, the weakening of feudal power, and the restoration of power to the Mikado, indicating the end of local as well as of national isolation. In the last fifty years Japan has become a great military and naval power, and has defeated China and Russia, her rivals on the opposite side of the Yellow Sea. Japan obtained Formosa after a successful war with China (1894–5), and ten years later won from Russia the southern half of Sakhalin, Port Arthur, and the chief influence in Korea.

Formosa falls steeply to the Pacific in the east, and rises inland to forested mountains (14,000 feet) which supply camphor and other tropical forest produce. The lowlands are in the west, opposite to China, from which they were colonized. The products are those of the opposite mainland. The largest centre is Taiwan (Taichu).

INDO-CHINA.

Configuration. From south-east Tibet three lines of mountains can be traced. The easternmost runs through Annam and is separated by the gorges of the Mekong from the central line, which follows the trend of the Malay peninsula. The gorges of the Salwin separate this from the westernmost, or Arakan Mountains, which form the western boundary of Burma.

The upper courses of the great rivers of Indo-China are densely forested and difficult to penetrate. They form the Shan States, which, whether nominally subject to China, Siam,

or Britain, are in reality almost independent. The inhabitants practise some agriculture, but subsist mainly by hunting and the collecting of forest produce. Mineral wealth, including gems, is known to be abundant, and various schemes are proposed for developing the natural resources and improving the communications. The rivers, which are long and swift, and loaded with sediment, have built up a series of rich deltaic lowlands whose soil is deepened by periodic floods. These are very similar to each other in climate. In all rice is the staple agricultural product. Isolated from each other by forested mountains, each of these lowlands became an independent native state. The delta of the Songkoi, or Red River, forms Tongking (French), with Hanoi as its capital, at the head of the delta. In the delta of the Mekong are Cambodia and Cochin China. The former was once a powerful kingdom, centring round the great Tonlé Sap Lake, which regulated the summer floods of the Mekong. Here colossal ruins bear witness to the existence of an early and wealthy civilization. The present capital is Saigon, east of the delta. The mountains and narrow coastal plains of Annam, with winter rains, lie between Tongking and Cambodia. The capital is Hué. All these are French. The delta of the Menam forms the kingdom of Siam, with Bangkok as its capital. Lower Burma consists of the deltas of the Salwin, with Moulmein, and of the Irawadi, with Rangoon. While all the other lowlands are deltaic the Irawadi lowland extends far inland into the highlands, forming Upper Burma. The old capital is Mandalay, where the routes by the Irawadi, which is navigable up to Bhamo, not far from the Chinese frontier, and by the parallel Pegu lowland, converge. The teak forests of Upper Burma are among the most important of its resources.

The highlands of the Malay peninsula and the lowlands along their margin form independent native states, many of them under British protection. Lying in the equatorial belt, with hot summers and winters with two rainy seasons (see p. 5) they are densely forested. Tin-mining is important.

The British island of Singapore, commanding the route between the Malay peninsula and Sumatra into the Sunda Sea, is a point on which many ocean routes converge.

THE MALAY ARCHIPELAGO.

This includes the islands between Asia and Australia, but the name must not be understood to mean that all are inhabited by people of one race. The lowlands open to

FIG. 75. Indo-China and Malay Archipelago.

narrow seas, in which the winds blow with great regularity and storms are rare. Intercourse by sea has consequently always been easy. The conquered races have found refuge in the forested highlands, and these causes have contributed to great intermixture.

Configuration. Both margins of the archipelago are bounded by volcanic island chains. That on the Indian Ocean side is formed by Sumatra, Java, and the smaller

Sunda Islands, which rise high on the oceanic side out of some of the deepest seas in the world. On the inner margin they sink to shallow seas, to which lowlands open. The western marginal chain bends and converges with the Pacific marginal chain, which is traced through the Spice or Molucca Islands and the Philippines. Mindanao in the south, and Luzon in the north are the largest of the latter. The Philippines and Moluccas sink to deep seas on both sides, those on the Pacific margin being deepest. In the centre of the Malay archipelago Borneo and Celebes rise above shallow seas, Borneo from the continental shelf of Asia. In both high inaccessible forested mountains radiate from a centre, and are separated either by gulfs, as in Celebes, or by lowlands, as in Borneo. In Borneo the river lowlands form numerous states, of which Sarawak, under an independent English ruler, is the most important. Each state is isolated from its neighbours by land, and throughout the archipelago sea-power is all-important. Superiority in this respect led to the gradual expansion into the Malay archipelago of the Portuguese, Spaniards, and Dutch, followed later by the British, and lastly by the United States, who annexed the Philippines in 1898.

The two western entrances to this Asiatic Mediterranean are by the Malacca Strait, with Singapore as its key, and the Sunda Strait, commanded by Batavia, in Java, the capital of the Dutch East Indies. The third centre is Manila, in Luzon, equidistant from every point of the mainland, and the converging point of many routes.

All the islands of the Malay archipelago are in the equatorial region or on its margin. The forests yield a large variety of produce, including many spices. In the Philippine islands Manila hemp, a fibre of great strength, is an important economic plant. The sago palm is widely distributed, and forms a staple food.

Climate and Products. Economically the most advanced island is Java. It has a fertile volcanic soil, regular rains,

a great range of elevation, and a corresponding variety of products, from rubber and coco-nut, in the hot coastal lowlands, through zones in which sugar, coffee, cotton, quinine, and other tropical plants are grown, to the temperate mountain slopes where temperate cereals do well. The staples are coffee and quinine.

INDIA AND CEYLON.

Configuration. Geographically India consists of four distinct regions (1) the northern mountains; (2) the Deccan tableland of peninsular India; (3) the alluvial Indo-Gangetic lowland between them, and (4) Ceylon.

Climate and Products. India is separated from continental Asia by a mountain wall three to six miles high, whose height prevents any climatic communication. In winter the Indian isotherms run nearly along the parallels of latitude, and the temperature increases from the north, where the winters are cool, to the south. The air-pressure diminishes from north to south. The winds blow south towards the regions of lower pressure, but are deflected by the Earth's rotation to the right (being in the northern hemisphere) and blow as the north-east monsoon or north-east trade winds. These are dry winds, except where they have crossed seas. (Cf. Figs. 60 to 67, and also *Junior Geography*, Figs. 110 and 111.)

In early summer the hottest area is over the Deccan, but by midsummer it has moved north to the Indus lowlands and Baluchistan, where a vast low-pressure system is formed. The winds blow in from the oceans to the south, but are deflected by rotation, and blow as the south-west monsoon. This brings very heavy rains to the Western Ghats, the steep western escarpment of the Deccan, but passes inland as a dry wind. East of the margin of the Western Deccan is an area of low rainfall. On the east of the peninsula the south-west monsoon blows across the Bay of Bengal, striking the hills of Assam, the wettest place in the world, and the Himalayas.

The Bay and the Ganges valley, between the Himalayas and the Deccan, form a line of least resistance, and the winds follow the trend of the valley, blowing as a south-east monsoon. They reach the Indus as dry winds, and as the wet south-west winds from the Arabian Gulf are deflected along the northern margin of the Deccan, the great Thar desert is formed between the Indus and the Deccan.

The extreme south-east of India and the east of Ceylon receive rains from the retreating south-west winds towards the end of the year. Compare these with the winter rains of Annam.

The difference between the winter and summer temperature of Northern and Southern India limits many species of palms to Southern India and Ceylon, where the conditions are tropical. The forests of the wet Western Ghats produce teak and sal. The Himalayan forests have already been described.

Except in Ceylon, where the conditions are almost equatorial, the cultivated plants are those of all monsoon lands. Rice is grown in the areas with heavy summer rains, or capable of abundant irrigation. Wheat in winter, millet on poorer soils, pulses and oil-seeds, sugar-cane, indigo, tobacco, and opium are typical crops. Tea is grown on the hill-slopes of the lower Himalayas, especially in Assam, and also in Ceylon. Coffee is cultivated on the lee slopes of the Western Ghats, and in Ceylon. Cotton and jute are the chief fibre plants. The latter is grown in the Ganges delta. Much of the Deccan is covered with black volcanic soil, which retains moisture and is especially suited for cotton.

The Northern Mountains. These have already been described. The only practicable routes to the lowlands at their base are in the north-west, where passes lead from Afghanistan to the Indus. The Himalayan passes, all extremely difficult, lead only to the bleak plateau of Tibet, behind which are the mountains and deserts of Central and Eastern Asia.

The Deccan. The Deccan, forming peninsular India, is difficult of access. The Thar desert prevents access from the Indus across the intervening lowlands. The steep, densely-forested escarpment (Western Ghats) makes the interior inaccessible from the Arabian Sea, and though the table-land descends much less steeply to the Bay of Bengal, the coast is sandy, surf-beaten, and harbourless.

The northern margin of the Deccan forms the Aravalli hills,

FIG. 76. The Configuration of India. Notice the continuation of the Arakan Chain in the submerged range, above which the Andaman and Nikobar Islands rise, west of and parallel to the Malay Peninsula.

rising steeply above the Thar desert. The hydrographical centre is in the north-east, from which the Narbada and Tapti flow west, and the Son and the Mahanadi east. The steep northern wall of the Narbada valley is formed by

the Vindhya Mountains, and the southern by the Mahadeo and Satpura Mountains, separated by the Khandwa Gap. This gap forms a route from the Narbada to the Tapti, which follows the southern margin of the Satpura Mountains. South of the Tapti the Godavari, Kistna, Cauvery and other tributaries all flow east in steep inaccessible upper

FIG. 77. The Central and Southern Deccan.

valleys, forming falls in their descent. Those of the Cauvery are employed to generate electric power on a large scale. In their lower courses these rivers form deltas, which have long been irrigated for rice fields, and are densely peopled. These are connected by a coastal lowland, which is broadest south of the Godavari.

The east and west direction of the river-valleys renders communication difficult between north and south, and has favoured the growth of native states, of which Haidarabad and Mysore are the most important. In the former coal is abundant; in the latter gold.

On the west or Malabar coast important routes open from the Gulf of Cambay, to which both the Narbada and Tapti flow. One route goes between the northern base of the Aravalli Hills and the southern margin of the Thar desert to Delhi and the Ganges. The other is controlled by Surat, near the mouth of the Tapti, where a British factory was established early in the seventeenth century. The route across the tableland follows the Tapti to the Khandwa Gap, by which it reaches the upper Narbada, and crosses the northern foreland of the Deccan to Allahabad, at the confluence of the Jumna and the Ganges. Bombay leads to no natural route up the Ghats, but has a fine harbour. Since first a road and then a railway were carried up the escarpment and the Suez Canal was opened, it has become the chief port of Western India. Through it is exported a part of the cotton crop of the Deccan and Gujarat, and it manufactures most of the remainder into cotton yarns and cloth. Poona, close to the western escarpment, commands all the routes across the Deccan, and was long the centre of the Mahratta power. In the extreme south Calicut commands the route by the Palghat Gap (1,000 feet) between the Nilghiri and Anamali Hills (about 8,000 feet).

The shallow Palk Strait between the mainland and Ceylon cannot be navigated, and vessels bound for the Bay of Bengal must round the island. On the Coromandel coast the chief port is Madras, with an artificial harbour, but well situated in the centre of the fertile lowlands at the point where the route from the south by the Palghat Gap meets that from the north by the upper Kistna and Penner. At the head of the Bay of Bengal is the delta of the Ganges, entered by the Hughli distributary, with Calcutta as its port.

The Indo-Gangetic Lowland. The Indo-Gangetic lowland has been built up at the base of the northern mountains out of the sediment brought down by the Indus, Ganges, and their tributaries, in the same way as the Po lowland at the base of the Alps. As in the case of the Po the course of the Ganges is pushed far south by the impetus of its Himalayan tributaries, which is greater than that of the Deccan tributaries (see p. 40). Notice that the lower course of the Indus, which receives no tributaries from the mountains, is much closer to their base.

A belt of slightly higher ground crosses the lowland, connecting the Himalayan with the Deccan foreland, and dividing the lowland into an eastern and western half, corresponding to the basins of the Ganges and Indus.

The Indus Lowland. The Indus receives all its important tributaries from the Himalayas and the Hindu Kush. The Jehlam, Chenab, Ravi, Beas, and Sutlej water the Punjab, or Land of the Five Rivers. Nearly dry in spring, they become broad, deep, swift rivers when the Himalayan snows melt in summer. Much of their water is distributed by a network of irrigation canals to the arid lands, or *doabs*, between them. These are being transformed into a great wheat-producing region, the produce of which is shipped from Karachi, the port west of the delta.

The Punjab towns are associated either with the fertile areas round the rivers or with the routes to these. Peshawar commands the Indian exit from the Khaibar Pass, and Multan, near the confluence of the Five Rivers, the routes between north and south. Parallel to the base of the Himalayas, on the upper courses of the five tributaries, is a line of cities, of which Lahore and Amritsar should be noted. The former is the capital of the Punjab, an important centre of railways, routes, and manufactures. Amritsar, the capital of the Sikhs, manufactures silks and other textiles. Historically the most important is Delhi, built where desert and fertile lands, plains and highlands meet, thus controlling routes in all

directions, and in particular the route from the Indus to the Ganges.

The importance of this latter route is due to the physical conditions of the Lower Indus basin. This lies in the Thar desert, with the states of Rajputana round its oases, which are along its southern margin at the base of the Deccan foreland. All incoming peoples, after reaching the Indus by the north-western passes, have been turned east by the desert towards the Ganges, to reach which Delhi must be taken. Its selection as the Mogul capital is thus explained.

The Lower Indus receives no tributaries of importance, and except in summer carries little water. The only town of consequence is Haidarabad, the capital of the arid province of Sind, at the head of the delta, which is difficult of navigation. The port is Karachi. The salt marshes of the Rann of Kutch, south of the delta, are a continuation of the Thar desert.

The Ganges Lowland. The Ganges lowland presents a striking contrast. It receives summer monsoon rains, and can be irrigated on a large scale from the Ganges and its tributaries. It is the natural objective of all routes from the north, and early became the seat of a great agricultural civilization, and of a dense population. Ancient and splendid cities are numerous, many practising fine textile and metal handicrafts, as well as modern industries. Its fertility has exposed it to constant invasion from the north, but the latest conquest, that by Britain, was made from the sea.

The Jumna, the chief tributary of the Ganges, flows west of the main stream, past Delhi and Agra, both with splendid monuments of the Mogul rule. Below Agra it receives the Chambul from the Malwa plateau of the Deccan, where cotton and opium are extensively grown. Allahabad, at its confluence with the Ganges, where the route by the upper Narbada reaches it, commands routes in all directions. Cawnpur, on the main stream, is of modern growth. Lucknow, on a navigable tributary, was the ancient capital of Oudh. Mirzapur, with carpet and metal manufactures, was formerly the great grain

and cotton market, when these were carried by the Ganges. At Benares many influences converge. It is the holy city of Hinduism, and combines ancient handicrafts with modern manufactures. Patna, in the rich opium, indigo, and rice lands of the Lower Ganges, is on the site of one of the oldest cities in India. The Ganges enters the sea by a vast delta, continuous with that of the Brahmaputra, which flows from Assam. The southern margin consists of densely forested swamps, and islands (Sunderbunds), inhabited chiefly by beasts of prey and reptiles. Calcutta, on the Hughli distributary

FIG. 78. The Basins of the Ganges and Brahmaputra.

eighty miles from the sea, is the outlet from the Ganges and Brahmaputra valley, and the seat of government. The summer capital is the hill-station of Simla.

Ceylon is flat in the north, where rice, rubber, and coco-nut, &c., are cultivated. It is a lofty and much-dissected highland in the south, rising to 8,300 feet in Pedrotallagalla. On the slopes of well-watered valleys tea is cultivated, replacing coffee, which has been largely rooted out owing to disease. Quinine and cacao are also grown, all under European supervision. Kandy is the centre of this highland. Colombo on

the west coast is not merely important as the outlet for Ceylon products, but is a calling-place and coaling-station on the Suez Canal route from Europe to Eastern Asia and Australia.

Historical Summary. At the dawn of history India was already highly civilized, and divided among independent states. The Persian and Greek conquests were only temporary. The Mohammedan invasions, which began about A. D. 1000, culminated in the foundation of the Mogul Empire under Baber in the sixteenth century. From its capital, Delhi, the Deccan was conquered, but proved difficult to hold, and the rival Mahratta power, with its capital at Poona, became a formidable rival in the seventeenth century.

The first European settlements did not aim at acquiring territory. On the west coast the British had trading-stations at Surat and Bombay, and the Portuguese at Calicut, but there was no advance inland. Territorial conquest began in the east, where the ascent to the tableland is less steep, and there is easy communication along the lowlands at its base. The French, from Pondicherri, and the British, from Madras, were rivals for the possession of the Deccan, but the latter were the victors. The Mahratta power was pushed north, and a struggle ensued for the possession of the Ganges. The victory of Plassy opened the route into Bengal from the sea, and that of Delhi, at the beginning of the nineteenth century, completed the conquest of Bengal. From Delhi expansion into the Indus basin naturally followed, and was completed by the middle of the century. Since then the fighting has been for the control of the north-west routes, and has led to the creation of new provinces in that direction.

THE MID-WORLD DESERTS.

Deserts. The desert conditions already described as prevailing in parts of the plateaus of Central Asia result in great part from the configuration. High mountain margins intercept all moist winds and intensify the normal aridity

caused by great distance from the ocean. In the deserts at the southern base of the Mid-World Mountains configuration and distance from the sea are less important than their position in a region of high air-pressure between 15° and 35° N. Here the trade winds (see p. 211 ; *Jun. Geogr.*, pp. 217, 218) are blowing towards the equatorial belt of low pressure, and are dry except where they have crossed wide seas. Deserts extend from the Thar desert of the Indus (see p. 212) across Arabia and the African Sahara to the Atlantic Ocean. Nowhere else in the track of the trade winds is the land mass

Fig. 79. The Mid-World Deserts.

so extensive, and consequently nowhere else are the deserts on so great a scale.

The Old World Tablelands. South of the Mid-World Mountains the Old World is a tableland, broken up by the seas which cover areas which have sunk down. To the extreme south-east this tableland is represented by West and Central Australia, in the centre by the Deccan and Ceylon, and in the west by Arabia, Madagascar, and nearly all Africa south of the Atlas, which is the African member of the Mid-World Mountain System. The Guiana and Brazilian Highlands of South America are possibly part of the same tableland, cut off by the sinking of the South Atlantic Ocean.

Faults and Rifts. Beneath the solid crust of the Earth

internal forces are continually causing rearrangements of the materials of which the Earth's interior is composed. This may lead to the wrinkling of the crust into a series of crumplings or foldings, as in all the mountain regions yet described. Where the strata are too rigid to yield in this way they give way or fracture under strain, forming what are called faults. This has happened in the Old World Tablelands. Fault lines are well seen along the sharp edge of the east coast of Madagascar, or the western escarpment of the Deccan. The strata retain their original horizontal direction, giving the tabular configuration.

Faulting may take place along two parallel lines, and a rift may then be formed by the sinking of the area between. Such a rift extends across Syria (see p. 23) and is continued by the Gulf of Akaba, between Arabia and the Sinai Peninsula, to the Red Sea. From the Red Sea it can be traced east and south of Abyssinia, through East Africa, where it is filled by Lake Rudolph and other long, narrow lakes. Lake Nyasa, further south, is either a separate rift or a continuation of the eastern rift. A parallel rift farther west contains Lakes Albert, Albert Edward, and Tanganyika, all with the typical long, narrow configuration of rift lakes and seas. Along these rifts are many signs of volcanic activity, and the western rift, south of Albert Edward Nyanza (*nyanza*= lake), is overlooked by a group of active volcanoes.

The Red Sea rift and the narrow isthmus of Suez politically separate the continents of Africa and Eurasia. From the point of view of climate and products the boundary is rather the Mesopotamian lowland and the Persian Gulf.

Arabia. On either side of the deep Red Sea the borders of the tableland are high. They slope gradually away from it to Mesopotamia in the east and to the Nile valley in the west. West of the Syrian rift the tableland sinks to the fertile littoral of the Mediterranean (see p. 24). Very little of Arabia is less than 1,500 feet above sea-level, and in the extreme south, in Yemen, in the centre, in Nejd, and in the south-east, in Oman,

it is considerably higher. The coastal plains, except along the Mediterranean, are dry and barren, but the higher parts of Yemen, Nejd, and Oman receive enough rain to support some agriculture and a settled population. The higher slopes of Yemen receive a little rain from the south-west monsoon,

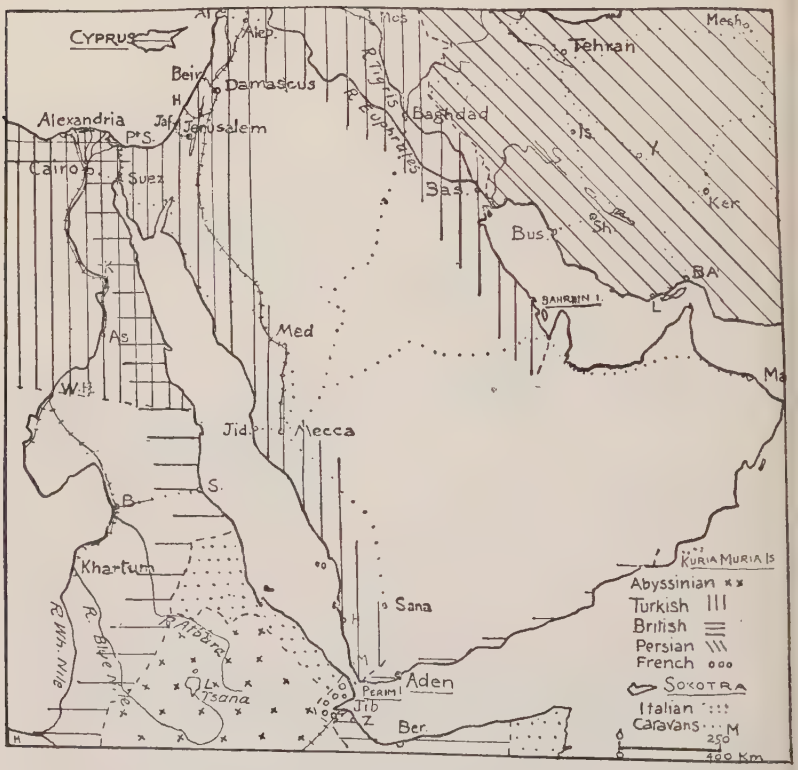


FIG. 80. Arabia. N.B. The Mecca railway is not quite completed.

and produce coffee, cereals, fruits, and, in the drier parts, frankincense and other gums. Oman is inaccessible from every side but the coast, which is inhabited by hardy fishing peoples, engaged in the pearl fisheries of the Persian Gulf. The ports of Sohar, Barka, Maskat, and Sur are all prosperous.

The next zone is agricultural. The margin of the great southern desert of Arabia which separates Oman from both Nejd and Yemen is pastoral. Nejd is a collection of many oases, set between two deserts. The northern desert, or Nefud, passes into the Syrian desert, which extends to Damascus. Nejd is agricultural in the oases, in which the date is largely cultivated, and pastoral on their margin. The desert proper here and there affords occasional pasturage in favourable seasons. It is crossed by camel routes from oasis to oasis. Otherwise it is uninhabited. Nejd is most accessible from Mesopotamia. It would never be crossed to the west but for the Moslem pilgrimages to Mecca, where Mahomet was born, and Medina, where he died. A route from Baghdad crosses Nejd, and there is another route round the western margin of the desert from Damascus, now partly followed by a railway. Mecca is in arid surroundings, and lives only by the pilgrim traffic. Medina is in an oasis. Jidda, the port for Mecca, also depends entirely on the pilgrim traffic. In Yemen Hodeida has replaced Mocha as the chief port. Aden is a British coaling-station, commanding the entrance to the Red Sea.

The Arabian deserts separate the fertile lands of Egypt and Mesopotamia, and cut off the Mediterranean from the Indian Ocean. Hence the great importance of the routes between east and west and north and south, where the desert is narrowest. In ancient times the most famous led from the Nile delta across Palestine to Damascus and crossed the Syrian desert at its narrowest to the Euphrates. In modern times the main route is by the ship-canal across the isthmus of Suez and the Red Sea. The other routes from Egypt to the Red Sea were important in ancient days when the north of the Red Sea could not be navigated through the prevalence of strong north winds.

Politically, most of Arabia is included in the Turkish Empire. Nejd is practically independent under local chiefs, owing to the difficulties of controlling it effectively across the desert. Oman, which is still more effectively isolated, is independent.

EGYPT.

Egypt nominally includes an area of 300,000 square miles, but of this only about 11,000 square miles are habitable. Inhabited Egypt consists of the long, narrow valley of the Nile, from five to thirty miles wide, enclosed on either side by the high edges of the tableland. The Nile enters the Mediterranean by a delta, which, like the valley, has been gradually built up of the sediment carried down by the river. This forms Lower Egypt.

Egypt, like Mesopotamia, Gangetic India, and China, early became the seat of a great agricultural civilization, which depended for its existence on the summer Nile floods. As Egypt is rainless, the cause of this annual rise was a mystery to the ancients. It is now known to be due to the rains brought by the summer monsoon to the lofty Abyssinian Highlands, and carried down to the Nile by its Abyssinian affluents, the Blue Nile and the Atbara. At Khartum, where the muddy Blue Nile unites with the White Nile, the latter is clear. It is to Abyssinia that Egypt owes the fertilizing mud which covers the valley and delta to a depth of many feet, and to which something is added in each successive flood.

The main stream of the great river which has created Egypt and keeps it fertile, rises south of the equator at a height of over 6,000 feet, and descends by a series of lakes and rapids to the Sudan (see p. 233). From the confluence of the Blue Nile it falls nearly 1,000 feet, mainly by six cataracts, of which only the lowest, or first cataract, is in Egypt. At the base of the first cataract is Aswan, the ancient Syene, whose former grandeur is shown by the ruins of magnificent temples. It communicates with the Mediterranean by an unbroken navigable waterway, and also commands a pass across the eastern hills to the Red Sea, where the ancient port of Berenice was situated. Below the confluence of the Atbara the Nile receives no tributaries, and its volume diminishes. Of the seven mouths by which it anciently entered the Mediterranean, all but the Rosetta and Damietta branches

are now closed by bars, forming coastal lagoons, which prevent communication with the interior.

Climate of Egypt. Egypt has the typical desert climate (see p. 227). The daily range of temperature is as marked as the seasonal. The summer days are intensely hot, the winter nights are cold. Rain seldom falls, except along the coast of the Mediterranean. The annual rainfall at Alexandria is 9 inches, but at Cairo only 2 inches. Agriculture depends entirely on irrigation.

Irrigation and Agriculture. The ancient Egyptian method of irrigation was the basin system. The land on both sides of the Nile, which is slightly above the level of the valley, was divided by earthen dykes into basins, or compartments. Shallow canals admitted the flood waters from basin to basin, those farthest from the river on the desert margin being last reached. In the soaked earth winter crops of cereals and pulses were raised. The depression of the Fayum, west of the delta, was irrigated from the Bahr-el-Yusuf, which flows parallel to the Nile. In addition there must, as at the present time, have been much laborious irrigation with water raised in small quantities by hand or

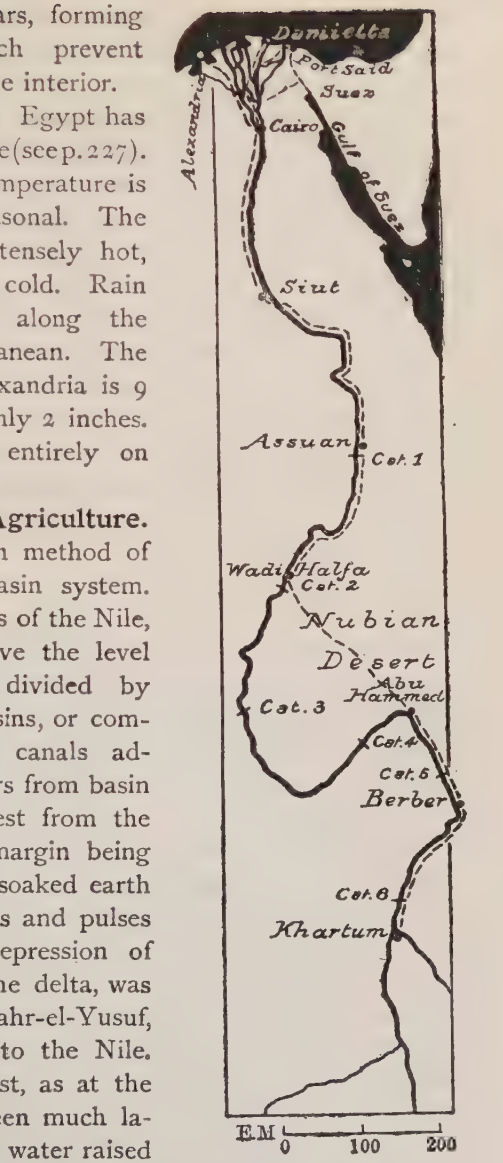


FIG. 81. Egypt.

animal power. The modern method of irrigation allows agriculture to be practised all the year round. The river is dammed back to form a head of water, from which water is drawn off by deep canals, and distributed to the network of irrigation canals below the dam. Canals thus fed can be kept full all the year. This method was first applied to Lower Egypt by damming the Nile at the apex of the delta. It is now extended to Upper Egypt. The river has been dammed at Aswan, and a second regulating dam built at Assiut. The sluices are shut down towards the end of the Nile flood, and gradually opened as the next flood rises.

The Nile flood is highest at Aswan about the middle of September, and at Cairo about a month later. The height varies from year to year. A poor Nile rises about 21 feet at Aswan, a good Nile from 26 to 27 feet, and a dangerous Nile about 30 feet. The amount of land which can be irrigated varies in proportion.

Egypt has three seasons. In the winter season the Nile is falling, and the land under cultivation is at a maximum. Wheat, barley, clover, and pulses are the chief winter crops. In the summer season the Nile reaches its lowest, and only the lands capable of perennial irrigation are under cultivation. The crops are cotton, sugar, millet, rice, fruits, and vegetables. In the flood season the Nile is high, and the crops are maize, millet, and rice.

Routes and Towns. Egypt is shut in by deserts except on the north. It can be entered by two routes from the Mediterranean, (1) west of the delta by Alexandria, and (2) east of it from Port Said or Ismailia. It was for the control of the latter route that the battle of Tel-el-Kebir was fought in 1882. This was the route by which Egypt and the Mesopotamian empires repeatedly attacked each other, and by which Arabs, Mongols, and Turks successively overran Egypt. Except by these two entrances communication was anciently prevented by the marshes of the delta, and now by the lagoons and irrigation canals. The Egyptians were never a seafaring

people, and the foundation of Alexandria, the outlet for Egypt and the chief port of the Eastern Mediterranean, was due to Alexander. Port Said is the modern creation of the Suez Canal.

There has always been a great city at the apex of the delta, where these routes converge. Cairo is the modern representative of Memphis and Heliopolis. The other centre of ancient Egypt was Thebes (the modern Luxor), where the Nile most nearly approaches the Red Sea. The strategic importance of Aswan has already been noted. The modern representative of the ancient route to the Red Sea from Syene is the railway from Berber, between the fifth cataract and the confluence of the Atbara, to Port Sudan, north of Suakin, across the desert south of the Egyptian frontier. This is connected with the railway which runs from the second cataract at Wadi Halfa across the desert to Abu Hamed, and the line is continued from Berber to Khartum.

THE SAHARA.

Configuration. The Sahara is a low tableland, most of which is less than 1,000 feet above the sea. It is crossed from north-west to south-east by a higher belt, highest in the south-east in the Tibesti plateau (9,000 feet). This divides the Sahara into a Western desert and an Eastern, or Libyan, desert. There are numerous watercourses, but few are permanently filled with water. A number of short rivers flow from the Atlas, fertilizing the oases at the base. Much of the surface is rocky or stony, but over large areas it is covered by sand-dunes. The formation of these is due to the peculiarities of the desert climate.

Climate. Where vegetation is present it prevents the soil from being rapidly heated during the hours of sunlight, and as rapidly chilled after sunset by radiation. The stony or rocky plateaus of the Sahara have not this protective covering, and experience great daily and seasonal variations of temperature. In summer most of the Sahara has a temperature of over 90° F., and is the hottest part of Africa. The outer layers of

rock are alternately expanding and contracting with great rapidity. In the process they split in all directions. Large areas are covered with rock waste of this kind, forming stony deserts. In the same way the smaller fragments are gradually worn down into fine sand, which is caught up and carried by the wind, and heaped into wave-like dunes, which may be as much as 1,000 feet or more high. These dunes are imperceptibly but steadily pushed on by the wind, and often encroach on fertile oases.

There are three large areas of sand dunes in the Sahara; one in the east, covering the greater part of the Libyan desert; another, less continuous, in the centre, west of the Tibesti plateau; and a third in the Western desert, stretching south of the Atlas almost unbroken towards the south-west.

The greater part of the Sahara is almost rainless. The Aïr and Tibesti plateaus are high enough to receive occasional violent rains, and these contain fertile tracts.

Vegetation and Oases. The lack of vegetation is due to the lack of moisture. The soil is potentially very fertile. A shower of rain or heavy fall of dew may stir into life dormant seeds, and cover a considerable area with a blush of green. If such showers occur fairly regularly from time to time they may support a scrub of dwarf thorny plants (tamarisk, gum acacia), adapted to resist long drought, or coarse dry grasses on which animals can be grazed. Most of the scanty moisture sinks through the soil, reappearing at a lower level as wells or springs, round which oases develop.

In the oases agriculture and a scanty settled population are found. The date palm is the most valuable product, and without it the desert would hardly be habitable. In the larger oases, which can be irrigated from permanent streams, cereals and pulses are cultivated to a small extent. In the better parts of the Sahara and on the margin of the oases, the keeping of camels, goats, and sheep is the occupation of nomadic tent-dwellers.

Oases and Routes. Some of the more important oases

may be grouped along lines of depression. Siwa is the largest of those dotted along the depression between the Fayum and the Gulf of Sydra, north of the Libyan desert. Biskra, Lagwat, Figig, and Tafilet form another line at the base of the Atlas. Tugurt, Ghadames, Wargla, and Twat are in the depression between the Atlas and the higher tableland to the south-east. These lines of oases form important routes along the northern part of the desert, and facilitated the Arab conquest in the seventh century A. D.

The routes from north to south between the Mediterranean

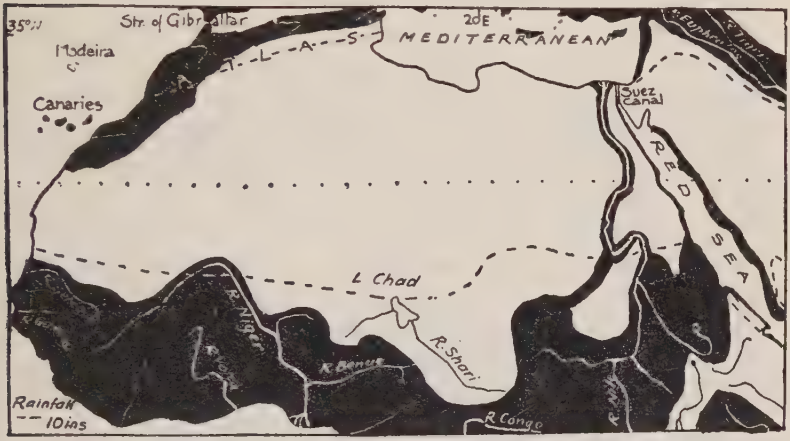


FIG. 82. North Africa. Inland Drainage Areas left white.

and the Sudan follow other lines of oases. The most important is across the great Nile oasis of Egypt. Another route goes from Benghazi, in Barka, by the Kufra oasis of the Libyan desert, to the western part of the Egyptian Sudan. From Tripoli routes go by the Murzuk oases in Fezzan, at the northern end of the Tibesti plateau, either south to Lake Chad or south-west by Agades, at the base of the Aïr plateau, to the Niger Sudan. Important routes from Tripoli, Fez, and Wargla concentrate on the Twat oasis, whence they follow a depression to Timbuktu, the terminus of a route from Marocco, and the

link between the Western Sahara and Sudan. All these routes are followed by camel caravans, which may take weeks or months on the way, dividing the journey into stages where food and water can be obtained. If delayed by sandstorms, or if the wells are dry, a caravan may perish from thirst. The trade between the Mediterranean and the Sudan is very ancient, but it is beginning to decline as the Sudan finds outlets to the south by sea.

THE SUDAN.

The Sudan. South of about 15° N. the year is divided into a long dry season and a short wet summer season (see p. 10), which becomes longer towards the south. The desert gradually passes into a wooded grass land or savana (see p. 13).

This savana belt forms the Sudan, which extends from the Atlantic nearly to the Red Sea. The southern limit is in the west the divide between the Niger and the rivers flowing directly to the Gulf of Guinea, in the centre the divide between the Chad basin of inland drainage and the Congo, and in the east it approaches within about 5° of the equator. The Western Sudan consists of the basins of the Senegal and Gambia and of the Upper and Middle Niger, the Central Sudan of the Lake Chad basin, and the Eastern Sudan of the basin of the Middle Nile. Somaliland is outside the typical Sudan, but on its eastern margin.

Western Sudan. The Futa Jallon Highlands, on the south-west margin of the Sudan, form the hydrographical centre, in or near which rise the Senegal and Gambia, flowing north and west to the Atlantic, and the Niger. The Niger flows north-east to the base of the highlands, and winds with a slight slope across the Sudan to the margin of the Sahara, where Timbuktu is built near the river. Here it turns south-east in a gorge-like valley, interrupted by rapids as it descends the terraces of the plateau. The navigation of all the African rivers is interrupted in this way, owing to the tabular configuration of the continent. Hence they do not form routes to

the interior, though they are often navigable for long distances above and below the falls. On the left bank the Niger receives the Kaduna and the Benue, separated by the Lanthan Highlands. The northern slopes of these highlands are drained east by the Wobi to Lake Chad, a marshy lake of varying dimensions, whose chief affluent is the Shari, from the wetter regions to the south-east.

Climate. The Sudan has three seasons, a hot dry season from February to June, a hot wet season from July to September, and the season of the Harmattan, a dry, easterly, dust-laden wind from the Sahara, from October to January. The mean annual temperature is about 80° F., but temperatures of over 100° are common, while frost occasionally occurs through the loss of heat by radiation. The daily range is often 30°. The rainfall increases from about 10 inches per annum on the desert margin, to 60 inches in the south, on the margin of the equatorial wet belt. The Sudan is thus a transition region between the desert, which is too dry for agriculture, and the hot moist forests to the south, where excessive heat and damp are also unfavourable to agriculture.

Products and Occupations. Except in the drier north and east, the Sudan is essentially agricultural. Two crops of dhurra millet, the chief cereal, can be grown in the best parts. Other products are wheat, maize, rice, beans, cotton, indigo, tobacco, and the kola nut, a powerful stimulant. Gum acacias characterize the drier eastern region, especially round Lake Chad. Yams, ground-nuts, pepper, the oil palm, the shea butter tree, sandalwood, and rubber indicate the approach to equatorial conditions. The soil is admirably suited to cotton, which supplies an important native manufacture.

The high repute of the Sudan manufactures in North Africa is one cause of the considerable caravan trade across the desert. Marocco leather, made at Kano of skins imported from the pastoral lands on the margin, is sent across the desert to Tripoli, the market. Cotton cloths, dyed with native indigo, are also in great demand.

Routes. The Upper Niger becomes very shallow as it crosses the arid northern region, where it receives no tributaries. It is continuously navigable only below the rapids, near the southern margin of the Sudan. The Benue is the main waterway to the interior, but it is unhealthy and infested by the tse-tse fly, which is fatal to animals. Lake Chad is reached by the Wobi.

The French Sudan. The greater, though not the richer, part of the Sudan is French. Northern Nigeria and the lower Gambia (capital, Bathurst) are British. French expansion has proceeded from the old colony of Senegambia, whose capital, St. Louis, on the Senegal, is connected by rail with the much

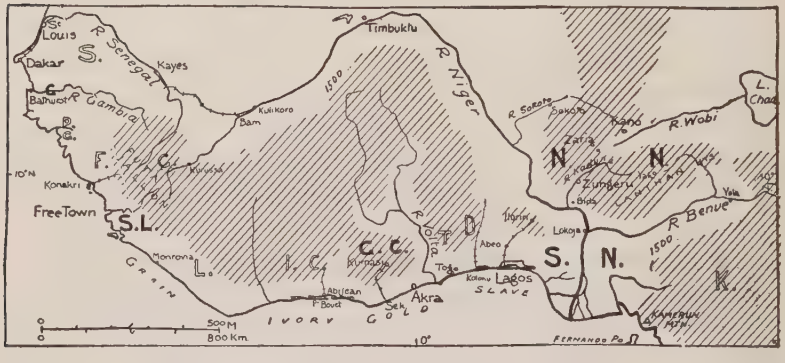


FIG. 83. The Western Sudan and Upper Guinea.

superior port of Dakar. The route to the interior is by the Senegal to Kayes, by railway to the Niger at Kulikoro, and by river to Timbuktu, the capital of the French Sudan, to which routes across the Sahara converge. The region east of Lake Chad is reached from French Congo, of which it forms the northern part.

The British Sudan. British Nigeria is the highest and most fertile part of the Sudan. It has long been occupied by semi-civilized agricultural tribes of mixed blood. The white strain predominates round Lake Chad, and on the northern margin, while on the Middle Niger the Hausa, a negroid race

of high type, is the predominant element. This mixture of blood points to a long struggle between north and south for the possession of the fertile intermediate region. Through the north came probably the civilization, and certainly the religion, which is Mohammedan. The settled Hausas, skilful farmers, craftsmen, and traders, were conquered by the pastoral Fulani in the eighteenth century. A century later Hausa soldiers were led by British officers from the south against Sokoto and Kano, the chief Fulani centres. Sokoto is the centre of the Mohammedan faith in the Western Sudan. Kano, in a highly fertile region not far from the desert margin, has been for 1,000 years the great market. It collects the produce of the Sudan and forwards it by caravan to Tripoli. The other centres are more modern. Lokoja, opposite the confluence of the Benue, is the natural gateway of the Sudan on the south, and will grow as the Benue route increases in importance. Zungeru must become a considerable place from its position where the route from the Niger to Kano crosses the Kaduna. Zaria (2,000 feet high), on the same route, is the healthiest place in Nigeria. It is in the heart of a fertile region, and will become an important centre. A railway is being built through this region.

The Egyptian Sudan. The Egyptian Sudan is surrounded by a horseshoe of heights which separate the Chad and Congo basins from the Nile. In the east the great tableland of Abyssinia rises to 15,000 feet. The tributaries from the western curve of the horseshoe are carried to the Nile by the Bahr-el-Ghazel, through great swamps. Nearly opposite comes in the Sobat from Southern Abyssinia. The centre of the Nile basin is flat in the Sudan, though about 1,500 feet above the sea. The rivers form great swamps many miles wide, but are navigable except where impeded by the floating vegetation known as sadd. The climate is that of the Western Sudan, but drier.

The peoples of the Nile margin are fishers along its banks, and herdsmen farther from the river. The highlands are occupied by not very advanced agricultural communities.

The southern and eastern margins of the Sudan are rich, but in recent years they have been harried by the pastoral Dervishes, a fanatical Mohammedan sect strongly opposed to European influence. In 1885 their leader, the Mahdi, took and destroyed Khartum, and made his capital at the neighbouring Omdurman, on the White Nile. Khartum, at the confluence of the Blue and White Nile, where routes converge from all directions on the margin of the desert, is the key of the Eastern Sudan, and its possession is essential to the security of Egypt. It was retaken by the battle of Omdurman in 1898, and from that base the Egyptian Sudan was gradually reconquered. The Dervish power is not crushed, but it has been driven far west of the Nile, the only route south of Khartum. Gondokoro on the southern margin of the Sudan, lies at the end of the series of rapids which occur between 4° and 5° N.

Abyssinia is a lofty tableland covered with hard volcanic rock, in which the rivers cut deep narrow gorges. The difficulty of crossing these deep fissures interrupts communications. The higher parts receive heavy summer rains, which swell the shallow Blue Nile and Atbara to immense rivers, and carry the loose volcanic soil to the plains.

Abyssinia has three zones of climate and products. Up to 5,000 feet both resemble those of the Sudan. From 5,000 to 9,000 feet is the warm belt, where the vine grows. Still higher are the cool lands, cultivated with cereals. Most of the country is pastoral.

The difficulty of communication has favoured the growth of rival chiefs, and the capital has varied with the ascendancy of different tribes. At present it is at Addis Abbaba, in the centre.

Abyssinia forms a difficult barrier between the Nile and the Red Sea, and there are no easy routes across it. Routes from Khartum and Berber converge on Gondar, the ecclesiastical capital, north of Lake Tana, a mountain-girt basin in which the Blue Nile rises. From Gondar the route continues

north-east by Axum, a former capital, to Massawa, on the Red Sea, in the Italian colony of Eritrea. A railway is beginning to follow this route inland. An eastern route leads from Addis Abbaba to the Gulf of Aden. A line is being built from Jibuti, in French Somaliland, by Harrar, the largest town, to Addis Abbaba.

Somaliland. Somaliland, the Horn of Africa, is a transition region between the Sudan and Arabia, but more nearly resembles the latter, from which it is separated by a strait only fifteen miles wide. Too low to condense the monsoon rains, it is a thinly-peopled pastoral region. Part of it belongs to Abyssinia, the rest to Britain, France, and Italy. To the European powers its value lies in its control of the route from the Gulf of Aden to Abyssinia and the Nile. Italy appeared likely to obtain the control of Abyssinia, but received a crushing defeat at Adowa in 1896.

THE GUINEA LANDS.

The Guineas. The Guinea lands extend from the Futa Jallon Highlands to south of the mouth of the Congo. The Niger delta divides them into Upper and Lower Guinea.

Upper Guinea. Upper Guinea rises from a low, sandy, surf-beaten coast, backed by swampy forests, to the forested highlands which separate the rivers flowing south to the Gulf of Guinea from the Niger. The former are short in the west but longer in the centre, where the highlands recede from the coast. Their deltas are covered with mangrove swamps, but they are navigable for small boats to the base of the highlands (see Fig. 83).

The climate is uniformly hot, and the range of temperature small. An area of low pressure is formed over the land, towards which the south-east trade winds are drawn north across the equator and deflected to the right in the northern hemisphere. Having crossed the seas they are moisture laden. The Upper Guinea Highlands deflect them upwards, causing

heavy rains at all seasons. The only break is when the dry Harmattan blows from the Sahara (see p. 231).

The influence of constant heat and moisture on forest growth has already been described (see p. 15). The Guinea coast is a typical equatorial forest region, difficult to penetrate except by the creeks and streams. Rubber is found everywhere. Ground-nuts are important in the west, and the oil palm in the east, especially in Nigeria. The chief cultivated plants are coffee and cotton. Trade is hampered by the difficulty of bringing down produce through the forest and of shipping it from a harbourless coast through dangerous surf.

Equatorial conditions are unfavourable to a high type of civilization. The needs of life are few and simple. Only small groups can be formed, and these are hostile to each other. The dark forest affords cover for stealthy attack, and creates a lurking dread of the unseen, whether human or superhuman, which results in many degrading superstitions and revolting practices. Such a region has no history as we understand it.

Notwithstanding the difficulty of access various European powers from the sixteenth century onwards maintained trading factories at points on the coast. The nature of the produce collected is indicated by the names Grain (spice grains), Ivory, Gold, and Slave Coast. Only in recent years has the interior been parcelled out. Liberia is a free negro republic. The European powers are Britain, Portugal, France, and Germany. The British colonies are Sierra Leone, with the good harbour of Freetown, the Gold Coast, with Akra, leading to Ashanti, and Southern Nigeria, which now includes Lagos. Freetown and Lagos are the chief markets of West Africa. Lines are being built inland from the various coast ports, the most important being those from Lagos by Ilorin towards the Niger, whose densely forested delta forms a route to the interior continued by the Benue (see p. 232); from Konakri in French Guinea towards the Niger, and from Sekondi on the Gold Coast to Kumasi, the capital of Ashanti (see also Fig. 83).

Lower Guinea. The Lower Guinea Highlands are the high edge of the interior plateau. In the extreme north, where the coast begins to trend south, the volcanic Kamerun group exceeds 13,000 feet. The vegetation is tropical forest up to 5,000 feet, and temperate up to 7,000 feet, above which are grass lands, passing into moorland. Above all these is the ash cone.

The northern part of the Lower Guinea Highlands forms the German Kamerun colony, with fertile clearings in which cacao and coffee are grown, and with savanas above the forests.

French Congo is very similar in climate and products, but has the advantage of access to the Congo, which forms the frontier with the Congo Free State. Libreville, on the Gabun estuary, has a fine harbour. Other centres are Loango on the coast, and Brazzaville on Stanley Pool. The southern part of these highlands forms Angola (Portuguese). Angola is flat and arid on the coast, but rises inland to the plateau, which reaches 7,500 feet. The tropical forests of the lower slopes produce rubber and palm oil. Coffee is exported from Ambriz, São Paulo de Loanda, and Benguela. Cotton and sugar are grown round Mossamedes in the south. Railways are gradually being built.

The Congo Basin. The Congo basin is a circular plain-like basin, 1,500 feet above the sea, surrounded on all sides by the edges of higher plateaus. The only break is in the north, where the Shari opens towards Lake Chad. To the east this highland rim rises to the heights overlooking the Western Rift Valley; in the south-west to those forming the Congo-Zambezi divide. All these are in the wet belt and the tributaries from them carry an enormous volume of water down to the main stream. The lowest elevation, to which both tributaries and the main stream flow, crosses the circular basin from north-east to south-west, and is indicated by the line of the Ubangi-Congo.

The main stream rises in the highlands south of Lake Tanganyika, and flows through Lakes Bangweolo and Mweru,

receiving among many tributaries the Lukuga, from Lake Tanganyika and the Aruwimi from the highlands west of Lake Albert. In its descent to the 1,500 feet level it forms the Stanley Falls, and all its tributaries are similarly interrupted before reaching this level. Below its confluence with the Aruwimi the Congo is of lake-like breadth, and before leaving the basin it receives the Kwa, which gathers up the Kasai and innumerable tributaries from the Angola Highlands.

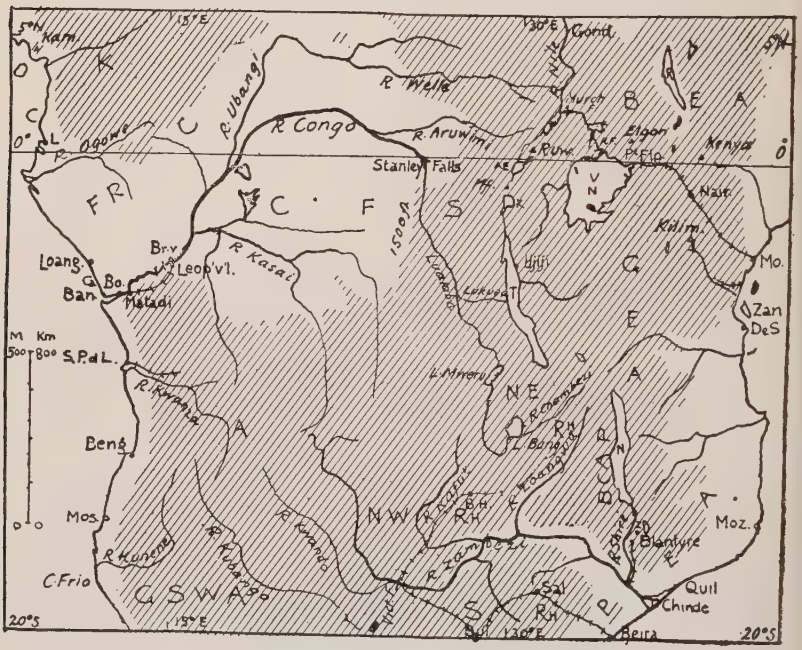


FIG. 84. Central and East Africa.

After expanding to Stanley Pool, the Congo leaves the basin by a deep gorge through the Lower Guinea Highlands, forming many falls in its descent to the coastal plain. This it crosses by a deep estuary 100 miles long. From Matadi, at the head of navigation, a railway is built up the highlands to Stanley Pool, on which is Leopoldville, the chief centre of the Congo Free State. There are over 6,000 miles of navigable

waters above Stanley Pool. Below Matadi the chief ports are Boma and Banana.

All the Congo basin is a typical equatorial forest region. Stanley marched for more than five months through unbroken forests on the Aruwimi, crossing streams every few hundred yards. Rubber is the chief product yet utilized. It is the staple of the Congo Free State.

As in Guinea the dense forest has definitely influenced the civilization. Its impenetrability to pursuit has made it the refuge of defeated peoples. The dwarf pygmies, who live by hunting with poisoned arrows, probably represent the most primitive of African races. Other tribes, though much superior physically, are otherwise debased. The forest supplies little animal food, for which they have a craving, and this leads to cannibalism. Such vices do not persist where geographical conditions allow large groups to be formed.

THE EASTERN SAVANAS.

East Central Africa. East Central Africa rises from a low, unhealthy coastal plain by steep terraced escarpments to a tableland about 4,000 feet high. This is crossed from north to south by two long rift valleys (see p. 221), with higher lands along their margins, and many signs of volcanic activity. East of the Eastern Rift are the great extinct volcanic masses of Kenya (17,000 feet) and Kilimanjaro (19,300 feet). The extinct Elgon (14,000 feet) rises west of this rift, north of Victoria Nyanza, a basin lake, filling a square depression as large as Scotland. The great mass of Ruwenzori (*cir.* 16,800 feet) east of the Western Rift between Lakes Albert and Albert Edward appears not to be of volcanic origin, but between Lakes Albert Edward and Kivu the Western Rift is blocked by the Mfumbiro group of active volcanoes (14,700 feet).

Lake Victoria and the Upper Nile. Lake Victoria, or Victoria Nyanza, lies 3,700 feet above the sea. It receives among other streams the Kagera from the west, the remotest

source of the Nile. Situated mainly south of the equator, and fed by heavy equatorial rains, Lake Victoria is a great reservoir whose waters keep the Nile from running dry in its long course across the desert. So long as the equatorial lakes are its chief feeders the Nile is low, the annual rise occurring only when the Abyssinian tributaries carry down the summer floods (see p. 234). The Nile leaves Lake Victoria at its northern end over the shallow Ripon Falls, crosses a fairly level swampy country and rushes over a series of falls, the last known as the Murchison Falls (140 feet), to the Western Rift and Lake Albert. Lake Albert (1,940 feet high) receives the outflow of the higher Albert Edward (3,000 feet), by the Semliki, which flows in the rift valley at the base of the snow peaks of Ruwenzori. Leaving Lake Albert the Nile follows the rift valley, now less well-marked, to the low plateau of the Eastern Sudan, which it enters about lat. 5° N. Across this it is navigable to the Sixth Cataract. Thus the Nile, like the Congo (p. 238) and the Niger (p. 230), has a navigable stretch of several hundred miles in its middle course above the falls by which it descends the last terraces of the tableland.

The South and East of the Eastern Tableland. South of Lake Victoria the tableland rises gradually to the Livingstone Mountains (10,000 feet) north-east of Lake Nyasa. The lake is drained by the Shiré to the Zambezi. From the highlands which end in the eastern escarpment of the plateau several large rivers descend to the Indian Ocean, but they are of little use for navigation.

Climate. East Central Africa is much higher than the Congo basin in the same latitudes, and the heat is therefore not so great. Three regions may be distinguished, (*a*) that round Lake Victoria, which receives heavy equatorial rains, and (*b*) the low, hot coastal plain, also very wet. Between the two is (*c*), a relatively dry area which is higher, cooler, and healthier.

Vegetation. Dense forests are found in the coastal plains and in the wet rift valleys. The banana grows profusely

round Lake Victoria, but not in the drier regions east of it, which are open woodlands, with large areas of poor scrub. The high peaks of Kenya and Kilimanjaro condense heavy rains, and at their base a belt of agricultural land interrupts the dry belt. Both on these mountains and on Ruwenzori, all of which rise above the snow-line in the highest peaks, there is the same succession of vegetation zones as in the Kamerun peak (see p. 237).

Occupations. The inhabitants are negroes of the Bantu stock. They are agricultural in the more fertile regions, and pastoral elsewhere. The northern herdsmen of mixed Hamitic white blood have often raided the settled peoples, and in Uganda, as in Hausaland (see p. 233) became the ruling aristocracy.

The Bantus have expanded widely over the savanas of Central Africa, pushing the weaker races southwards towards the southern deserts, and perhaps westwards into the equatorial forests.

Routes. East Central Africa is almost inaccessible from the west, from which it is cut off by high mountains and deep rifts. In the north the Nile is a natural route to the base of the higher tableland at Gondokoro, from which roads are being made to Entebbe, the capital of Uganda (British), on the northern shores of Lake Victoria. There is a considerable steamer traffic on the lake. From Port Florence, on a north-eastern bay, the Uganda railway runs east, descends to the Eastern Rift valley, runs south along its floor till a suitable ascent is found to the eastern plateau, passes Nairobi, and descends to Mombasa, the chief port of British East Africa. Farther south, off the coast of German East Africa, of which the capital and port is Dar-es-Salaam, is the island of Zanzibar, the great commercial centre of East Africa. Like the neighbouring island of Pemba, it supplies the world with cloves, and is British. Zanzibar, the capital, was the starting-point of the old slave caravan route which crossed to the mainland, climbed the escarpment in what is now German East Africa

to the Unyamwezi grass lands, where the route forked north to Lake Victoria or west to Ujiji on Lake Tanganyika. In Portuguese East Africa, the chief port is Mozambique, where the seas between Madagascar and the mainland are narrowest.

Savanas and Forests of the Zambezi. The Zambezi, like the Niger, rises where the plateau is high enough for savanas to replace forests. Its upper course trends away from the equator towards the desert, which it almost reaches. Its middle course is through the savanas of Rhodesia, and it enters the sea through a delta covered with dense tropical forest. Compare this with the very similar course of the Niger (see p. 230). The savana belt extends across Africa south of the Equator, in latitudes corresponding to those of the Sudan, with which it may be compared. On the east this savana belt is continuous from the Egyptian Sudan to the Zambezi. This is an exceptional circumstance, due to the elevation. The normal conditions are better seen in the west, where the two savana belts are separated by equatorial forests.

The Zambezi rises some 5,000 feet above the sea, near feeders of the Congo, in the ill-marked Congo-Zambezi divide. It crosses a flat, swampy, marshy region, and after receiving the Chobe turns east across a plateau of basalt, a hard volcanic rock, in which it has cut a narrow zigzag gorge 40 miles long. To this it drops over the Victoria Falls (350 feet) contracting from over a mile in breadth to little over 400 feet. In its middle course it descends the plateau terraces in a series of falls and rapids. Below the Kebrabasa Falls, the lowest, it is navigable for 400 miles. The most accessible of the distributaries of the delta is the mangrove-fringed Chinde.

The chief tributaries are all from the wetter north. The basin of the Kafwe forms the savanas of North-west Rhodesia and the Loangwa those of North-east Rhodesia, which is also drained by the Chambezi or Upper Congo. The Shiré drains Lake Nyasa, west of which is the Nyasaland (formerly British

Central African) Protectorate. The Lower Zambezi, from the Loangwa to the sea, is in Portuguese East Africa.

The natives of the Zambezi basin are mainly agricultural, combining hoe cultivation with the keeping of animals. The latter is impossible in the lower valleys, which are infested with the tse-tse fly, and very thinly peopled.

The lower Zambezi and its tributary the Shiré form the best route to the interior. The middle course of the Shiré is interrupted by falls, but it is navigable above and below. The obstructions are avoided by making roads, which are being replaced by railways. There is steamer communication on Lake Nyasa, and the route is continued from its northern end to Tanganyika by the Stevenson Road.

The highlands of the Nyasaland Protectorate resemble those of Angola or Northern Nigeria. Coffee, cotton, and wheat are cultivated. The chief settlement is Blantyre, and the capital Zomba. Northern Rhodesia is known to possess mineral in addition to other natural wealth. It is being rapidly opened up by the development of communications. The railway from Cape Town is now carried 300 miles north of the Zambezi Falls and is being pushed on towards Lake Tanganyika.

AFRICA SOUTH OF THE ZAMBEZI.

Configuration. Africa, south of the Zambezi, has the highest general configuration of any part of the continent. Little of it is below 3,000 feet, and the average elevation is from 4,000 to 5,000 feet. The valleys of the Zambezi, the Limpopo, and the Molopo, the latter a tributary of the Orange, form three lower belts, above which rise the South Rhodesian Highlands, between the Zambezi and Limpopo; the Damara-Nama plateau, west of the Molopo, and the High Veld (Hooge Veldt), in the south-east. Over most of this region the rock strata are nearly horizontal, and weather into flat-topped or pointed heights, known as *kopjes*. In the

drier west and centre wind erosion has done more than water erosion to shape the surface forms, producing scenery of the desert type (see p. 227). Towards the east this gradually passes into the more rounded water-eroded forms of the eastern terraces.

Both in the east and west the tableland descends in a series of terraces to a coastal plain or low coastal heights. Between the Zambezi and the Limpopo in the east, this plain becomes

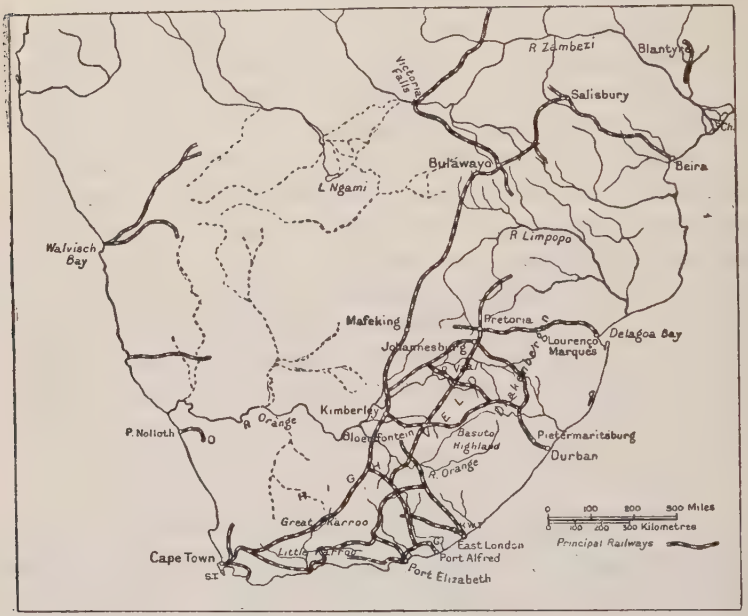


FIG. 85. South Africa.

wide, forming Gazaland, the southern part of Portuguese East Africa. In the south the plateau descends steeply to the Great Karroo (2,000–3,000 feet), beyond which are two parallel mountain ranges with the Little Karroo between.

Natural Regions. The natural regions are climatic rather than orographical. South of the southern belt of savanas the conditions resemble those of North Africa, but are modified

by (1) the narrowing of the continent; (2) its greater elevation, and (3) the absence of a land mass on the windward side, corresponding to Arabia on the north-east. For these reasons, while the region as a whole is dry, the area of absolute desert is much more restricted than in North Africa.

The eastern part of the South African tableland receives summer rains from the south-east trade winds. These are caused, like the north-east trades, by the inflowing of winds from a high pressure system with its axis from 30° to 35° towards the low pressure system round the equator. Being in the southern hemisphere the southerly winds are deflected by rotation to the left and blow as south-east winds. They are passing from cooler to warmer regions, and bring little rain except where they are forced upwards either by highlands or by ascending currents over the heated lands. Both these conditions are fulfilled in South-east Africa. The average elevation in the east is from 4,000 to 5,000 feet, and in summer this is reinforced by the rising of air over the heated surface of the relatively bare High Veld (see p. 247). Rains occur in summer, diminishing from the eastern margin of the High Veld towards the west. In winter the air tends to move outwards from the cooled surface of the land and this neutralizes the ascension caused by the highlands in the path of the trades. The winter rains are therefore confined to the coast, and are slight. In winter the stormy west winds come as far north as the extreme south of the continent, bringing winter rains to the extreme south-west and south coast, as in the Mediterranean. A small part of the south coast thus receives rain at all seasons, from the south-east trades in summer, and from the west winds in winter.

Southern Rhodesia and its Margins. Southern Rhodesia is a tableland about 4,000 feet high. The divide between the rivers flowing to the Zambezi and those flowing to the Indian Ocean crosses it from south-west to north-east. Lying within 20° of the equator it is warm at all seasons on the table-

land but hot in the lowlands. The centre receives heavy summer rains, diminishing towards the west and also towards the coast. The relative dryness of Gazaland may be compared with that of Somaliland. Southern Rhodesia is in the belt of southern savanas, passing into dense wet forests on the coastal lowlands of the east, which are in Portuguese West Africa, and into desert on the west.

The native tribes are both agricultural and pastoral, but crops are often ruined by swarms of locusts, one of the scourges of South Africa. The tse-tse fly ravages the lowlands. The region was raided early in the nineteenth century by the Matabele Zulus, who were conquered by the British at the end of the nineteenth century. The mineral wealth is very great. Gold has been worked and exported for several centuries and perhaps longer. The country is fit for European settlement only above the fever-line, which reaches 4,000 feet. Agriculture is as yet little developed and the principal occupation is mining.

In recent times the Rhodesian plateau has been reached from the south both by the Zulus and by the British. The main line from Cape Colony runs to Bulawayo, and continues across the Wankie Coalfields to the Victoria Falls and Northern Rhodesia. From Bulawayo a line runs parallel to the divide and west of it to Salisbury, the capital, whence it descends to the Portuguese port of Beira, which has replaced the ancient Sofala. This eastern entrance was the only one in use in the Middle Ages, and by it the Portuguese obtained much gold from the native tribes of the interior.

The South-West Deserts. The coastal strip is dry from the Congo southwards. It broadens into a wide desert area in the Damara-Nama plateau (German South-west Africa), and in the Kalahari desert and its margins (British Bechuanaland). Except on the higher parts of the plateau rain seldom falls. The surface is covered with a very sparse tufted vegetation, affording little nourishment. Such plants as possess water-storing properties are eagerly sought by the dwarf

Bushmen, who are found in fast decreasing numbers in the desert. On its margin are pastoral Hottentots and Bantus.

Walvisch Bay (British) is the only fair harbour. Farther north is the German port of Swakopmund, leading to the capital, Windhoek. The northern part of Bechuanaland is a basin of inland drainage to Ngami and other lakes. The eastern fertile margin is crossed by the line to Rhodesia. The southern part is in Cape Colony. Mafeking is the chief town.

The High Veld. The High Veld is highest in the south-east, in the Basuto Highlands, which form the hydrographic centre. From Mont aux Sources (11,000 feet) the Tugela flows east, the Orange south, the Caledon, a tributary of the Orange, west and south-west, and the Wilge north to the Vaal, which bends west and south-west to the Orange. The united Vaal-Orange flows west to the Atlantic, in a well-marked, steep-sided valley. Its volume diminishes towards the coast, and it is interrupted by many falls. Like all South African rivers it is rather a barrier than a route.

North of the Vaal three scarped ridges run east and west. The most important is the Witwatersrand, or Rand, rich in gold, in the south. Here rises the Crocodile, the head stream of the Limpopo which drains the northern margin of the High Veld. The eastern escarpment, known as the Drakensberg, descends to a rolling coastal region, broken in the north by the Lebombo Mountains, which form the eastern frontier of the Transvaal. In the south the margin of the High Veld is known under various names and descends to the flat plain of the Great Karroo, which forms the southern limit of the tableland. The highlands and plains south of it are old mountains much dissected. The feature-lines in the west run north and south. In the south they run from east to west, forming the Zwartebergen, on the southern margin of the Great Karroo, and the Langebergen, parallel to it and the coast, with the Little Karroo between. The topography of the south-west, where these two sets of feature-lines cross is extremely complicated.

The Karroos are dry regions, in which the rivers carry little water except after rain, when they become swollen torrents which rapidly deepen their valleys. The Gouritz breaks across the parallel ranges to the sea, receiving tributaries from between them (strike tributaries).

In the extreme south-west Table Mountain forms the north of a small isolated tableland, ending in the Cape of Good Hope (the Cape), with the Cape Flats between it and the Drakenstein Mountains in the east.

Political Divisions of the High Veld and its Margins. Politically the High Veld is divided into the Transvaal, between the Limpopo and the Orange, the Orange River Colony, between the Vaal and the Orange, Basutoland, in the Basuto Highlands, Natal and Zululand on the eastern margin south of Portuguese East Africa, and Cape Colony, south of the Orange River and Natal.

European settlements were originally made at suitable points on the coast, as half-way houses on the long sea route to India. The Portuguese settlements were at Algoa Bay and Delagoa Bay. The Dutch station was at Cape Town. Expansion inland was not originally contemplated, and was hardly attempted except by the Dutch. The anxiety of Britain to secure the Cape, which became British early in the nineteenth century, was because of its relation to the route to India.

Early Dutch expansion inland from Cape Town followed the east and west lines of the southern ranges and the Little Karroo. Much later there was a movement inland from Algoa Bay, where the chief town is Port Elizabeth. This was chiefly made by English and Germans.

Early white settlement hardly penetrated to the Great Karroo and the tableland, which became the refuge of the dispossessed Hottentots, pressed north by white expansion. At the same time they were pressed west towards the desert by Bantu tribes, who had followed the eastern savanas to their southern limit.

With the growth of European colonization settlement extended into the Karroos, which are too dry for agriculture. A distinctively pastoral type developed, especially among the Dutch, or Boer, settlers. The great mobility of the pastoral type has already been noted (see p. 184). During the political friction which followed the annexation of the Cape many Dutch trekked north, reaching the High Veld, between the Orange and the Vaal, which afterwards became the Orange Free State. Some descended the Drakensberg to Natal, where they were opposed by the Zulus and the English traders at Durban. Driven from Natal they trekked north into the High Veld north of the Vaal, which became the Transvaal. Natal became British.

Modern South Africa has thus developed from five isolated centres, Western Cape Colony, round Cape Town; Eastern Cape Colony round Port Elizabeth; Natal on the east coast; and the two Dutch republics on the tableland. Everywhere the whites are in a minority, and except in the mining districts the Dutch form the majority of the European population.

The Dutch republics were more isolated than any of the others, having no access to the sea. Much of the grazing on the High Veld is not rich, and each family requires a very large acreage for its stock. The consequent isolation of farm from farm helped to determine the peculiar independence and great conservatism of the Boer character.

A great change began with the discovery of the mineral wealth of the country. The discovery of diamonds at Kimberley in the sixties was soon followed by the extension of the railway and the influx of a mining and speculating population. This was intensified by the discovery of the Rand goldfield in the eighties. Two opposite types of civilization, with different ideals and needs, were thus brought face to face. A long period of friction culminated in the last Boer War (1899–1902) and the annexation of the Dutch Republics by Britain.

The Transvaal. The Transvaal consists of the healthy

bare High Veld, and the low unhealthy forested Low Veld in the valleys. The chief settlements are in the south and east. The latter has enough rain for agriculture, which is practised in the south mainly where irrigation is possible. Maize (mealies), tobacco, oranges, and lemons are grown. The greater part of the country is pastoral. The capital is Pretoria, but the largest town is Johannesburg, on the high bare ridge of the Rand. Situated near the eastern end of fifty miles of gold-bearing reef, and within easy reach of the coal mines of the Eastern Rand, it is the centre of a very dense population. Many of the mines are worked by imported Chinese labour.

The natural port of the Transvaal is Lourenço Marquez, on Delagoa Bay, but this is Portuguese. From it a line runs near the Barberton goldfields and the Middelburg coalfields to Pretoria, and is being continued east at the foot of the Magaliesberg, the northernmost of the Transvaal ridges, towards the main line in Bechuanaland. From Johannesburg lines run east to Durban, in Natal, south to the Cape Colony ports, and south-west at the foot of the Rand to the main line from Cape Town.

The Orange River Colony. This colony consists entirely of High Veld, and is pastoral except in the Caledon Valley, where wheat is grown. Diamonds are found in the west. The capital is Bloemfontein. The line from the Transvaal passes through the colony, towards Port Elizabeth and East London, with branches to Durban and Cape Town.

Basutoland. Basutoland is a Crown Colony, with hardly any white inhabitants.

Natal. Natal consists of three zones: (1) the hot coastal belt, where sugar, bananas, and sub-tropical fruits are grown, as well as tea in the north; (2) the middle agricultural zone, producing maize and other cereals; and (3) the upper pastoral zone, with some cereal cultivation.

In Natal the whites are far outnumbered by the Kaffirs or Zulus, a Bantu people. The sugar and tea plantations

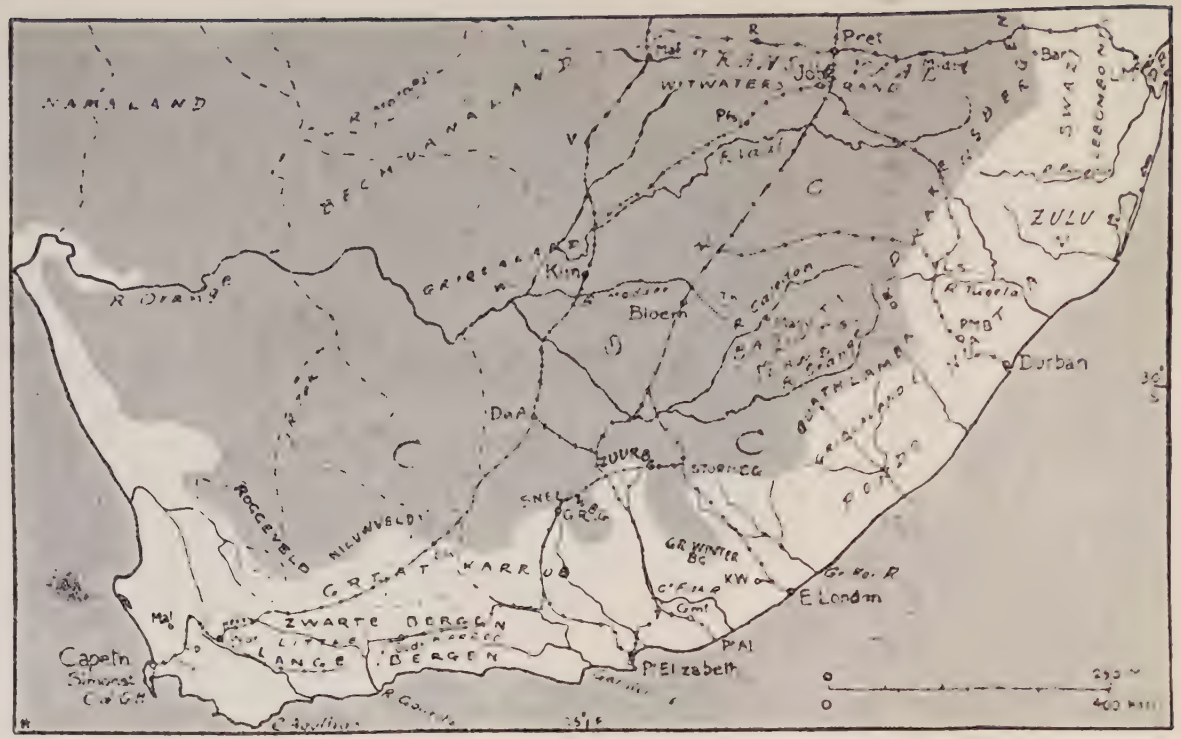


FIG. 86. Africa south of the Witwatersrand. The High Veld is shaded.

are worked by imported Indian coolies, who are as numerous as the whites. Many of them are farmers and traders. The chief port is Durban on Port Natal. From Durban one line runs north and south along the coastal zone, another climbs to the capital, Pietermaritzburg, in the central zone, to Ladysmith, the junction for the Orange River Colony line; the main line passes by the coalfields of Dundee and Newcastle in Northern Natal, and crosses the Drakensberg by Laing's Nek to the Transvaal.

Cape Colony. The greater part of Cape Colony is a poor pastoral region. The southern and eastern margins are

FIG. 87. The South-west of Cape Colony. The black area is over 3,000 feet above the sea.

more fertile. The extreme south-east resembles Natal, but nearly all the land is divided into small Kaffir holdings. Europeans have settled between the Kei River and Algoa Bay. The ports are East London and Port Elizabeth, and the chief inland town Grahamstown. Maize and sub-tropical fruits are grown. In the Karroos sheep and ostrich farming are important. Wool and ostrich feathers are exported from the ports, but these depend chiefly on the trade of the Rand. On the south coast tobacco is grown. The south-west is a typical Mediterranean region. Wheat is grown in the Malmesbury plains, and the vine on the northern slopes of

the hills. Fruit cultivation under irrigation is increasing in the Hex and other valleys. Cape Town, the capital, is the nearest port to Europe, on a magnificent bay. There are many small centres, such as Stellenbosch and Paarl.

The main line from Cape Town crosses the Cape Flats, turns into the Breede valley by the Tulbagh Kloof, follows the Hex valley and winds up its steep sides to the Great Karroo and the High Veld (cf. Fig. 87). This it crosses to the diamond mines of Kimberley, and continues north by Mafeking to Bulawayo. De Aar is the junction for the line between Port Elizabeth and the Transvaal.

AFRICAN ISLANDS.

The Western Islands are volcanic. The Azores, Ascension, Tristan d'Acunha, and others rise from the mid-Atlantic ridge. St. Helena is an isolated isle east of the ridge in the south Atlantic. The Madeira, Canary, and Cape Verde Islands all rise above relatively shallow seas off the coast, and the Guinea Islands run south-westwards in the Bight of Biafra.

The Azores lie 10° to 15° west of Portugal, of which state they form a part.

Madeira and Porto Santo are also Portuguese. They are rugged isles, cut by deep valleys or barranchos, with well-wooded lower slopes (Madeira = forest), carefully cultivated, and producing almost every kind of vegetable product of the hot and warm belts. Madeira was discovered by the Portuguese in 1419, who introduced the vine and other fruit trees. The capital is Funchal, from which wine and fruits are exported.

The Canaries, consisting of seven large and many small islands, have similar characteristics. Tenerife, the largest island, about the area of Warwickshire or Lanarkshire, rises to 12,200 feet in the Peak of Teyde. Santa Cruz, its port, is the capital of the Canaries, which are Spanish. Las Palmas, the largest town, is on Gran Canaria. The longitude of the westernmost island, Ferro, was once reckoned the zero

meridian. The Canaries are the Fortunate Isles of the ancients, and as they lie close to the African coast were reached earlier than Madeira in the Middle Ages.

The Cape Verde Islands are also volcanic, and, like some of the Canaries, have been active in recent times. They are in a much drier region, but produce similar products where water can be obtained. Cattle-rearing is important, and turtles are obtained in the surrounding seas. Porte Grande is a coaling-station for British steamers.

Fernando Po (Spanish) rises to 10,000 feet above the Gulf of Guinea, and has the same succession of vegetation on its sides as the Kamerun Peak (see p. 237).

Principe and S. Thomé (Portuguese) **and Annobon** (Spanish) are smaller islands in the Gulf of Guinea.

Ascension and St. Helena (British) were important as calling-stations before the opening of the Suez Canal. Jamestown, the capital of St. Helena, in the heart of the trade wind region was touched at on the homeward journey from India.

Madagascar is part of the great tableland of which Africa is a part. The two are now separated by the Mozambique channel, some 10,000 feet deep, which must have been formed long ago, as the lion, elephant, monkeys, and many other animals of Africa are not found in Madagascar. The island is larger than France, to which it belongs.

From the western coastal plain the land rises in terraces to the interior tableland, which sinks in steep escarpments to the straight eastern coast. This steeper side faces the trade winds and is the wettest, the south-west on the other hand being a comparatively dry region. Except in the south-west dense wet forests cover the lowlands, while the upper parts of the tableland form a savana. The peoples in the west are negroid, on the tableland in the east they are of Malay origin. The chief town is Tananarivo or Antananarivo in the centre of the island, which is connected by road with the east coast where Tamatave is the chief port. Majunga

is the north-western port, opposite the Comores Islands, which are also French. The mineral wealth is considerable.

Réunion (French), **Mauritius, and Rodriguez** (British) are volcanic. Réunion (formerly called Bourbon) is very rugged, rising to over 10,000 feet, Mauritius (formerly called Ile de France) is only a quarter this height. The islands lie east of Madagascar in latitudes corresponding to those of the Canaries. They receive more rain and are even more fertile. Sugar, cultivated by Hindu coolies, is the chief crop. Port Louis, the capital of Mauritius, has an excellent harbour.

The Seychelles and Admiralty Islands (British) are attached to Mauritius. Mahé in the Seychelles is a good harbour.

Sokotra (British), an outlier of the Somali peninsula, which it resembles in structure, climate, and products, rises to 4,600 feet. It commands the entrance to the Gulf of Aden.

AUSTRALIA.

Australia. The continent of Australia includes the island of New Guinea (312,000 square miles) in the north, the great island of Australia (3,000,000 square miles) in the centre, and Tasmania (26,000 square miles) in the south.

Excluding New Guinea, which is in the equatorial region, Australia consists of three physical regions: (1) the West and Central Tablelands, (2) the Central Lowlands, and (3) the Eastern Highlands, including Tasmania, which is separated from the mainland by Bass Strait.

Climate. Climatically Australia, excluding New Guinea, is in four regions: (1) the monsoon region, with summer rains, on the northern margin, (2) the region of the south-east trades, in the east, (3) the region of the westerly storm-winds with winter rains in the extreme south, and (4) the centre, a desert.

Plants and Animals. Australia originally formed part of the Old World, but was separated from it at a very early period, before the present Old-World Plants and animals had developed. A line drawn through the Spice Islands and

Timor roughly separates the Australian flora and fauna from the Oriental types of south-east Asia.

Australia has preserved many primitive forms of animal life which have died out elsewhere. Most of the animals are marsupials, provided with a pouch for carrying their helpless young. Of these the largest is the kangaroo. Other animals lay eggs, like reptiles, and suckle their young like mammals. Australia is lacking in the characteristic animals

Fig. 88. The Lowlands and Shallow Seas of the Australasian Region.

of the Old and New Worlds. Hence at the time of its discovery it had no domesticated animals.

The peculiarities of the Australian flora are less marked than those of the animals, as seeds can be transported for long distances by wind and water. The trees are for the most part eucalyptus of various species, and acacias, or wattles. Owing to the Earth's elliptical orbit the southern hemisphere is

nearer the Sun in the southern summer than is the northern hemisphere in the northern summer (see *Oxford World Geog.*). Hence the summer heat is greater than in corresponding latitudes in the northern hemisphere. As a protection the trees hang their leaves edgewise instead of spreading them out to the sun. This reduces the evaporation. They shed their bark instead of their leaves.

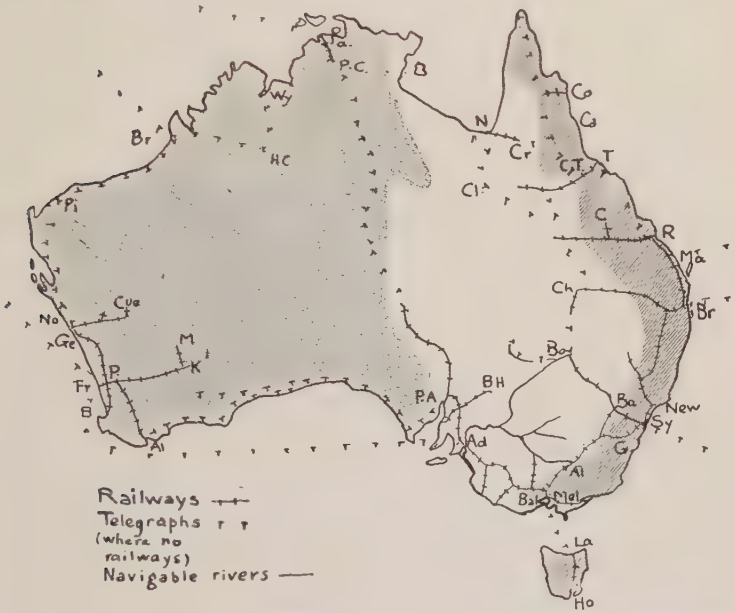


FIG. 89. The Physical Divisions of Australia. The western shaded part is tableland, the white area the Central Lowland, and the eastern shaded part the Eastern Highlands. Parts of the Central Lowlands are over 600 feet, as shown in Fig. 88, but they are not much over it except in the South Australian Highlands.

New Guinea. In New Guinea the feature-lines run from east to west. The centre and north are mountainous, with two or more parallel ranges. The Bismarck and Owen Stanley Ranges are over 13,000 feet. The latter forms the long narrow south-east peninsula, and a submerged range can be traced in the D'Entrecasteaux and Louisiade Islands. The south is

a lowland, sloping to Torres Strait and the seas which separate New Guinea from Australia. It is drained by the Fly River.

The mountains form a climatic barrier separating the north, which has very heavy monsoonal rains in the southern summer, from the south, which receives winter rains from the south-east trades when these are drawn north across the equator in the northern summer (see p. 193). In the south the rainfall is seventy-two inches per annum, but nearly twice as much falls in the wettest parts of the monsoon area. The temperature is everywhere high (cf. Figs. 137, 138 in *Junior Geography*).

New Guinea is densely forested, and as yet little progress has been made into the interior. Tropical species are found in the lowlands (coco-nut) and lower mountain slopes (camphor), with open woodlands of the savana type higher. Owing to the low latitude the mountains, notwithstanding their height, are covered with vegetation to the summit.

As in all forested lands, the native population is distributed in small groups, which practise some agriculture round their villages. The pig is the chief domestic animal. Cannibalism occasionally occurs. The coast tribes are adventurous seamen and fishermen. Trading voyages to different parts of the coast are regularly undertaken. The surrounding seas are rich in pearls and in *bêche de mer*, a species of sea-slug, which is collected for the Chinese market, where it is esteemed a delicacy. Throughout New Guinea there is much race intermixture, chiefly with the mainland peoples in the west, and with those of the Pacific Islands in the east. This points to long and continuous communication by sea.

The white settlement of New Guinea is only beginning. The west is Dutch, the north-east German, and the south British, with Port Moresby as the centre. The chief products are sandalwood and copra, the dried flesh of the coco-nut, which is in great demand for making soap and candles. The mineral wealth is known to be abundant and to include gold, but it cannot be exploited without improved means of communication and a greater command of labour.

The Australian Tablelands. These form part of the Old-World Tablelands (see p. 220). Notice the same compactness of outline as in the other tablelands (the Deccan, Arabia, Africa).

The average elevation of the Australian tableland is over 1,000 feet. There are several higher areas round the margin; Arnhem Land in the north, the Kimberley region in the north-west, the Western Plateau parallel to the west coast, and the Central Plateau in the centre, with the Macdonnell and Musgrave ranges and Lake Amadeus between. In the south-west the escarpments of the Darling range descend to a coastal plain. Several short rivers descend from the western margin of the Tableland to the Indian Ocean, but few carry much water. The most important are the Fitzroy, from the Kimberley Plateau in the north, the Ashburton and Murchison in the centre, and the Swan in the south. The interior is a basin of inland drainage, with many salt lakes.

The North-west Margin of the Tableland. Western Australia lies in the same latitudes as Africa south of the Congo-Zambezi. The climatic differences between the two regions are largely due to differences in the configuration of sea and land. In latitudes where in Africa the western desert is found Australia has a considerable breadth of open woodlands, receiving rain from the north-west monsoon. This is explained by the fact that north-west Australia presents the conditions necessary for the developments of monsoon winds: (1) the presence of seas on the equatorial margin of (2) a land mass lying within the tropics, and (3) sufficiently heated in summer to form a low-pressure area with inflowing moisture-laden winds. In Africa, in the corresponding latitude and situation, (1) the continuity of the land from east to west northwards to far beyond the equator, (2) the much greater height of the tableland, and (3) the existence of a low-pressure system over Upper Guinea, prevent the formation of monsoon winds, and a desert results.

The north-west margin of the Australian Tableland is within

the tropics. The temperature is always high. The coastal margin has large areas of dense forest along the north of Arnhem Land, but generally the woods are of the open savana type. Further inland are grass lands, passing into desert.

Settlement is only beginning. The white population of Palmerston, on Port Darwin, is under a thousand. Palmerston is the terminus of an overland telegraph line from South Australia, and of a short railway inland.

The Desert Tablelands. The tropic of Capricorn bisects the Australian Tableland, as the tropic of Cancer bisects that of the Sahara. The same causes which make the Sahara a desert (see p. 220) make most of the Australian Tableland a desert. It resembles the Sahara in (1) the great summer heat, (2) the great range of daily and yearly temperature, (3) the rapid weathering of the exposed rocks, and (4) the formation of sandy and stony deserts. Australia, however, has no Nile to form a fertile belt from north to south. There are few fertile oases to facilitate communication. There is, however, a less arid belt running from east to west across the Tableland, separating the Sandy Desert in the north from the Victoria Desert in the south. Communication is largely by means of camels, which were introduced from Afghanistan with Afghan drivers in the second half of last century. This has rendered it possible to extend the range of settlement to fertile areas within the desert.

Gold is widely distributed over the Australian Tableland, especially in the west. In the north is the Kimberley field, near the sources of the Fitzroy. The Coolgardie, Kalgoorlie, Murchison, and Menzies mines in the centre, 300 or 400 miles from the coast, are extremely rich. They are some distance within the desert, in an arid region to which water must be carried in pipes from the coast. The difficulty of obtaining water limits mining to the margin of the desert. If wells could be sunk to water-bearing strata, as in some parts of Australia, and communications improved, the mining industry

and population would no doubt penetrate farther inland. Unlike the South African goldfields, the Australian mines are worked with white labour.

The South-west Margin. The south-west margin has hot summers and cool winters. In winter it is within the westerly storm-area, and like Cape Colony, which it resembles, receives winter rains. Vines and wheat are cultivated, but all Mediterranean products might be grown. The well-watered area is larger than in Cape Colony, and has extensive forests producing jarrah, and other hard woods. The drier parts are pastoral. Coal is found round Bunbury, near the coast. The ports are Albany, on King George's Sound, and Fremantle, on the Swan River, leading to Perth, the capital of West Australia. A line runs from the Bunbury coalfields to Perth, and to Geraldton, the northern port and the outlet for the Murchison goldfields. From Perth it is carried inland to Coolgardie, Kalgoorlie, and Menzies.

The western half of the Tableland forms the colony of **West Australia** (976,000 square miles). The remainder is in South Australia. The boundary between the two is quite artificial.

The Central Lowlands. The Central Lowlands stretch from north to south across the island, between the Tableland and the Eastern Highlands. They do not exceed 1,000 feet except in isolated highland areas, of which the South Australian Highlands are the most important. Between these and the Western Tableland is the Great Valley of South Australia, with Spencer Gulf in the south and Lake Torrens in the north. Farther east the St. Vincent Gulf is formed between two southern ranges of the South Australian Highlands, and the Lake Frome basin opens north between two similar ranges. The easternmost of these forms the Stanley Mountains, or Barrier Range, separating the lowlands of the Murray-Darling from the Great Valley. The north coast is broken by the shallow Gulf of Carpentaria, the submerged northern part of the Central Lowlands.

The lowland is lowest near the base of the Western Table-

land. Towards this minimum line flow the long rivers from the western slopes of the Eastern Highlands, the Murray-Darling in the south, which is turned south by the South Australian Highlands; Cooper's Creek, or Barcoo, in the centre, flowing to Lake Eyre, a depression north of the South Australian Highlands at or a little below sea-level; and the Flinders in the north, flowing to the Gulf of Carpentaria.

The Northern Margin of the Central Lowlands, like the coastal lands to east and west, is within the monsoon area, and is covered with forest passing into open woodlands. On the south these pass into scrub, and the scrub into desert. The industries are sheep-farming, with a little agriculture. Both are hampered by the scanty population, the lack of communications, and the scarcity of labour. Normanton is a small settlement at the extreme south of the Gulf of Carpentaria, with a railway to the rich goldfields of the Eastern Highlands.

The Centre and West of the Central Lowlands are a dry desert, less arid in the east, which contains large tracts of saltbush. This is a nourishing sheep pasture, which successfully resists protracted drought. The rainfall varies from five inches in the centre to ten or fifteen inches on the margin. Over large areas of this arid district water-bearing strata can be reached by sinking artesian wells, many of which yield an enormous flow, often at a very high temperature. This is chiefly used for watering stock. The existence of water in this form has enabled communication to be maintained across districts where no railway could ever pay. Of such routes the most important is the great stock road from South Australia across the desert to Western Queensland.

The South-west Margin of the Central Lowlands. The South Australian Highlands and their margins receive some winter rains, which are most abundant in the south. About 4,000 square miles are under cultivation, a hard wheat of fine quality and small yield being largely grown. Such Mediterranean fruits as the vine and olive do well. Elsewhere

the country is pastoral. The mineral wealth is great, and includes rich copper mines at Walleroo.

The colony of **South Australia** (900,000 square miles), which extends across Australia from north to south, originally grew up round Adelaide and the settlements round Spencer Gulf, which is still the only populous part of the colony. From these centres it penetrated inland by the Great Valley, till stopped by desert, which forms a broad belt by which the northern part of the colony is completely cut off. With the exception of the fertile area in the south, the largest and best parts of the Central Lowlands are in the colonies of Victoria, New South Wales, and Queensland.

The largest city in South Australia is Adelaide, the capital, containing nearly half the population. The ports are Glenelg and Port Adelaide. From Adelaide a line runs east to Melbourne, the capital of Victoria, at the southern base of the Eastern Highlands. Another line runs north of the southern margin and the drier lands between Lakes Torrens and Eyre, to the margin of the desert.

The Eastern Highlands are lowest and widest in the north, and narrower, more compact, and higher in the south.

The Northern Part of the Eastern Highlands forms the Cape York peninsula. The main drainage is to the Gulf of Carpentaria, to which the long rivers flow.

The Centre of the Eastern Highlands is drained to the Pacific by the Burdekin and Fitzroy. Both these rivers are formed by the union of long tributaries flowing from north and south in valleys parallel to the coast. Below their confluences they break through the Eastern Highlands in transverse valleys.

The Southern Part of the Eastern Highlands rises from a narrow coastal plain in steep escarpments. These are known as the New England Range in the north, the Blue Mountains in the centre, and in the southern and highest part, where Mount Townsend, in the Kosciusko group, reaches 7,300 feet, as the Australian Alps. They are continued south

beyond Bass Strait (150 miles wide) by the mountains of Tasmania. On the mainland the Eastern Highlands trend west, parallel to the south coast, and are known as the Grampians.

The southern part of the Eastern Highlands is very difficult to cross. The Blue Mountains are composed of horizontal sandstones, which weather into steep escarpments. These block the head of narrow and intricate ravines, shut

FIG. 90. South-eastern Australia. The shaded land is over 600 feet above sea-level.

in by high rock walls, through which the short east-flowing rivers descend to the sea.

The Murray-Darling. The long rivers of the Eastern Highlands all flow west. The main valley-line runs from north-east to south-west, and is followed by the Condamine-Darling-Murray. To it flow all the rivers from the western slopes of the Eastern Highlands south of the Condamine.

The most important are the Macquarie, a tributary of the Darling, and the Murray, with its tributary, the Murrumbidgee. The Murray, which leaves the high Australian Alps in a wild and inaccessible gorge, carries more water than any other of the tributaries, and though not the longest affluent is reckoned the main stream. All these rivers have the greater part of their course in the Central Lowlands. The Murray-Darling is deflected south by the Mount Lofty Mountains, the southern part of the South Australian Highlands. It enters the large shallow lagoon of Lake Alexandrina, separated from the sea by the long sandspit (100 miles) of the Coorong, through a narrow breach in which it reaches the sea. Owing to its shallowness it is navigable only for small vessels.

The coast of the Eastern Highlands is indented by numerous excellent harbours, which have formed the bases of settlement. The largest are Port Jackson, in the east, leading to Sydney, and Port Phillip, in the south, leading to Melbourne.

The seas east of the Eastern Highlands sink to great depths in the south, but in the north the continental shelf of Australia is wide. North of the tropic it is bordered by the Great Barrier Coral Reef, 1,200 miles long and over 100 miles broad in the south. This is broken at various points, the most important being opposite the Burdekin. It forms a natural breakwater. The channel between it and the mainland, which varies in width from 20 miles in the north to 150 miles in the south, is always calm. Owing to the many sunken reefs and islands it can only be safely navigated by day, or with the aid of a powerful searchlight.

Climate of the Eastern Highlands. The north and most of the central part are within the tropics, and have a high temperature all the year round. The northern part, which is surrounded by water on all sides but one, has a fair rainfall, chiefly brought by the summer monsoon. In the centre, where the highlands are wider, the coast receives rains from the south-east trades, chiefly in summer. As the highlands

are relatively low and broken, the moist winds penetrate for a considerable distance inland. In the south, where the highlands are narrowest and highest, the coastal ranges intercept the winds, and the interior is dry. In the extreme south the Australian Alps and the Grampians are in the winter track of the westerly storms, and form a Mediterranean region of winter rains. Tasmania has an equable climate, with rain at all seasons, but most in winter. As in Britain, the west is wetter than the east, and for the same reason.

The products of the Eastern Highlands vary with the region. The centre and north have dense tropical forests, or savana woodlands. The coco-nut grows near the sea, and the banana and all tropical fruits in the lowlands. Sugar is cultivated round Mackay, a little north of the tropic. To the south there is a gradual transition to warm, temperate conditions in a coastal region which may be compared with Natal. Maize is the chief cereal. The vine and orange are cultivated in the Mediterranean region and its margin.

The Eastern Highlands are drier on their western slopes, and form rich grassy downs, wooded in the river valleys. Here sheep-farming, the chief occupation of Eastern Australia, is carried on. It has been greatly injured by the introduction of rabbits, imported a few years ago from Europe. These not only destroy crops, but eat pasture so close that it is long in recovering. The better parts are cultivated with fruits and cereals. Still farther west are dry scrub lands extending into the eastern part of the Central Lowlands. This is also a pastoral region, but of a poorer type and more thinly settled.

Political Divisions. The north and centre of the Highlands form Queensland. The south is in New South Wales, and the extreme south in Victoria. Each of these colonies extends into the Central Lowlands, where the boundary with South Australia is quite artificial.

Queensland (668,000 square miles) consists of tropical highlands, sub-tropical highlands, and western plains. Tropical agriculture is developing in the coastal belt, where sugar, rice,

and tobacco are grown. Towns are numerous on the many good harbours of the coast. Mining is important in the highlands; the west is engaged in sheep-farming. The Darling and other downs have a deep fertile soil, in which cereals and fruits are being increasingly grown. The towns are small, but are growing.

The Queensland railways radiate from three centres, all on the coast, with easy routes to the interior. From Townsville, north of the Burdekin, a line runs to the Charters Towers goldfield, and is carried across the pastoral belt to the upper Diamantina, which flows as the Warburton to Lake Eyre. From Rockhampton a line runs to the Mount Morgan goldfields, one of the richest in the world, and thence to the pastoral lands of the upper Cooper's Creek. From Brisbane a line is carried across the narrowest part of the Highlands to the Darling Downs and the region of artesian wells in the extreme south-west, where settlement is very thin. Shorter lines run from Cooktown to the Palmer goldfields; from Bowen and Mackay through the sugar districts; and from Rockhampton, along the coastal plain by Maryborough, to Brisbane, the capital, with a quarter of the population. Manufactures are developing with coal from the neighbouring coalfield of Ipswich.

New South Wales (310,000 square miles). The northern part is warm on the coastal plain, where some sugar is grown. Behind this rise the New England and Liverpool Ranges, the western slopes of which form grassy downs continuing the Darling Downs of Queensland. South of the Liverpool Range the Hunter, flowing east, and the Macquarie, flowing west, form a route to the interior, and separate northern from southern New South Wales. This depression is followed by the line to Brisbane. South of the Hunter the coastal plain is less rich agriculturally, but coal is abundant round the Hunter and Illawarra rivers. Gold is worked round Bathurst and Goulburn, in the Blue Mountains (see Fig. 90).

The western slopes of the Eastern Highlands descend to the

Riverina district, a pastoral region, fertile where irrigated. Copper is mined at Cobar. At Willyama (Broken Hill), in the extreme west, on the margin of the Barrier Range, are rich silver mines, but these find their natural outlet by Adelaide.

Sydney, the capital, the second city in Australia in population, contains one-third of the population of the colony. It has an unrivalled harbour, and is the centre of the railways of the colony. A line runs along the coast to Newcastle, the port for the neighbouring coalfields, turns up the Hunter valley past Maitland, and crosses the New England Range to Brisbane. The main southern route follows the coast to the Illawarra, ascends the Blue Range, and sends branches to the goldfields of Bathurst and Goldburn. These unite farther west, and follow the base of the Australian Alps, crossing the Murray at Albury and thence running south-west to Melbourne.

Victoria (88,000 square miles). The south coast is pastoral. The northern slopes of the mountains are planted with olive and vine, and wine is becoming an important product. Ballarat and Bendigo are the centres of the gold region. The northern plains consist of poor scrub, and are pastoral except where they can be irrigated. The Mildura region, irrigated from the Murray, has peach and apricot orchards. Dairy-farming is developing in Gippsland, which is also rich in brown coal. The chief occupation everywhere is sheep-farming.

Melbourne, the capital, with a fine harbour, has a population of over half a million, considerably more than one-third of the population of the colony. Railways radiate east to Gippsland; north and west, across the mountains to the Murray and New South Wales; north-west to Adelaide; and south-west to the stations of South-west Victoria.

Tasmania is a much dissected highland, with narrow fertile agricultural valleys, forested mountain slopes, and grassy hill pastures. Tin, gold, silver, and coal are found in the highlands, especially in the west. The valleys of the Tamar, flowing north, and the Clyde, flowing south, cross the middle of the island. Launceston, on the Tamar estuary, in the north,

and Hobart, the capital, in the south, on the Derwent estuary, are the chief towns. They are joined by a railway, with branches to the east and west coast.

Historical Summary. Australia was known to the Portuguese and Dutch at the beginning of the seventeenth century. During that century the Dutch, pushing east and south from their centres in the Malay archipelago, explored the Australian seas and discovered Tasmania. To Australia they gave the name of New Holland. At the end of the eighteenth century Captain Cook explored parts of its shores, and took possession of it for Britain.

Australia, when discovered, possessed no animals suitable for domestication, and was forested in the regions suited for agriculture. It was thinly peopled by small tribes, who hunted kangaroos and other game in the grass lands on the desert margin. Weaker tribes were pushed into the forest or the desert. In the latter food was very scarce, and water obtainable chiefly from the water-storing roots of various plants (see p. 12). All the Australian tribes lived a wandering life, and possessed only the most rudimentary arts.

The first British settlement was a convict station at Botany Bay, south of Port Jackson, so called from the number of new plant-species observed by its discoverers. This was at the end of the eighteenth century, and may be taken as the founding of New South Wales. Sydney, with its magnificent harbour, soon grew in importance, and settlements extended thinly along the coastal plain. The route to the interior was blocked by the Blue Mountains, across which no practicable routes could be discovered for many years. This led to the formation of settlements in South Australia and Tasmania, which were reached by sea. The mountain barrier behind Sydney was at last crossed to the Macquarie and the Lachlan, a tributary of the Murrumbidgee, and the Central Lowlands were thus reached from the east. The colony of Victoria was incorporated in 1851. In that year the discovery of gold brought a great influx of population, and led to the rapid

growth of Melbourne, the capital. North of Sydney the first important settlement was at Moreton Bay, a good harbour protected by an island. Here Brisbane was built, and became the capital of Queensland, founded a few years later than Victoria. As in Victoria, the discovery of gold caused an immense influx of population, and indirectly stimulated development in other directions. West Australia is the youngest colony. It remained stationary till the discovery of gold in the nineties. All the colonies were federated in 1901.

As white settlements advanced it became evident that the prosperity of the country would long depend on sheep-farming. Large sheep-runs were occupied, and the wild game deliberately killed off to secure more grazing for sheep. Thus the natives found their hunting grounds contracted, and their game destroyed. They retaliated by cattle stealing and murder, and were often brutally punished by the whites. They are now found chiefly on the desert margin, but they are rapidly dying out.

Along the margin of the pastoral lands settlement ebbs and flows. Australian weather is marked by cycles, a series of dry years following a series of good years. During a cycle of good years the relatively abundant pasture in an area which is now desert attracted settlers towards the interior of Queensland, New South Wales, Victoria, and South Australia. A series of dry years followed, during which enormous numbers of stock perished, and many stations were abandoned. Under old conditions wild game, which is much more mobile than domesticated animals, would have left such areas before they were eaten bare, and after a series of good years their fertility would have revived. It is doubtful if this can happen when they have been eaten quite bare by starving stock and by the rabbits which are the scourge of pastoral Australia. In any case the process will be a very slow one, and it is evident that a great part of the interior can never be permanently occupied.

NEW ZEALAND.

Configuration. New Zealand consists of the large North and South (or Middle) Islands, separated by Cook Strait, and

FIG. 91. The North Island of New Zealand.

of the smaller Stewart Island, separated from South Island by Foveaux Strait. These stretch for 900 miles from south-west to north-east. In 1901 a proclamation extended the

boundaries of the dominion to include the Cook Islands, west of Tahiti. With these and other small islands the area is not quite 105,000 square miles.

The main direction of the feature-lines is from south-west

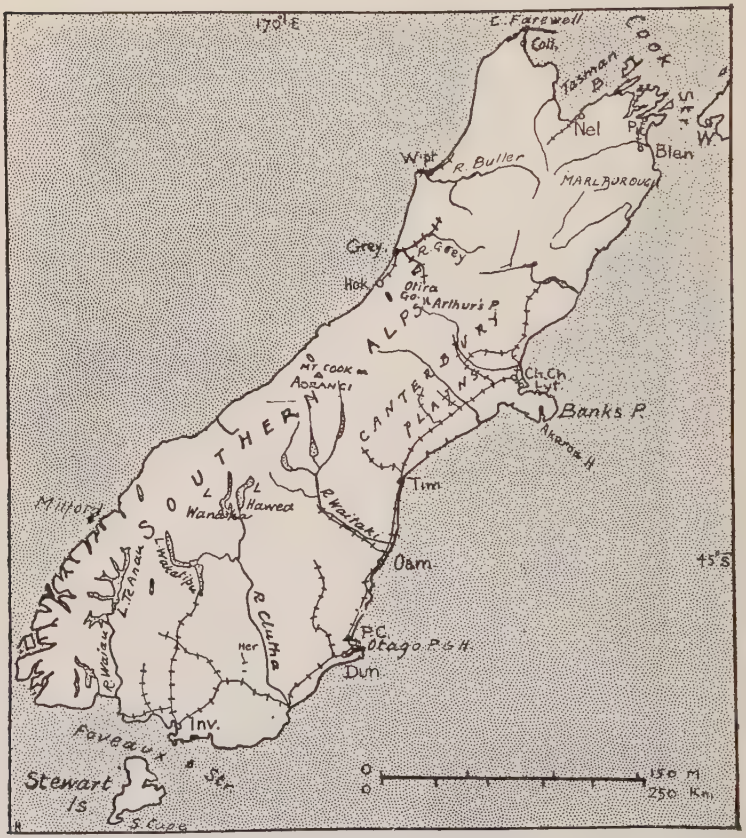


FIG. 92. The Southern Islands of New Zealand.

to north-east. In the North Island a long narrow peninsula, broken into many bays, runs north-west. These two directions are also well marked in the submarine feature-lines, as shown by soundings.

There is considerable volcanic activity in New Zealand. In North Island the volcanic areas are in the north and west. The perfect cone of Mount Egmont (8,270 feet) forms a western peninsula. In the centre are the active volcanoes of Tongariro and Ruapehu (9,000 feet) south of Lake Taupo, which is drained north by the Waikato, the largest river of New Zealand. North of this is a region of geysers and hot springs, which formerly contained the beautiful pink and white sinter terraces, deposited by the water of the hot springs. These were destroyed in the disastrous eruption of 1886. The basin of the Thames, opening north to the Hauraki Gulf, is the chief lowland. It is rich in gold. The eastern part of North Island is formed by a ridge of mountains parallel to the coast, broken by Hawke Bay.

This eastern range is continued south of Cook Strait, in the parallel ranges of the north-eastern part of South Island. These are separated by parallel valleys, the lower ends of which have been drowned, forming beautiful *rias*, or sounds, as they are locally called. The main mountain range of the South Island is close to the west coast. It is highest in the centre, where Aorangi, or Mount Cook, exceeds 12,000 feet. These ranges form the Southern Alps of New Zealand. They are remarkable for the number and size of their glaciers, some of which descend as low as 1,000 feet above sea-level. In the south, where the climate is coolest and the snow-line lowest, signs of former glaciation on a great scale are seen in the deep fiords of the west coast, and in the long narrow valley lakes of the eastern slopes. Some of the largest, Lake Wakatipu, Wanaka and Hawea, are drained south by the Clutha, and the great Te Anau by the Waiau. The east of the island is a rolling plain, broken by two volcanic peninsulas, Banks peninsula, with the fine harbour of Port Lyttelton, and Otago peninsula, with Otago harbour.

Climate. New Zealand is not the antipodes of Great Britain. The extreme north of the North Island corresponds in latitude to Malta, and the south of the South Island to

the Italian Lakes. The insular position, however, modifies the climate, and renders it equable. The mean annual temperature of Auckland, in the north of North Island, is 59° F., and that of Dunedin, in the south of South Island, 50° F. The mean annual temperature and range are both less than in other lands in the same latitudes. Combining all the advantages of warm and cool temperate lands, New Zealand is a colony ideally suited for North Europeans, and brings all the products of Central Europe to perfection.

In the northern part of North Island winter rains are heaviest, but, from its insular position, the summer drought is less well-marked than other regions with a Mediterranean climate. The rest of New Zealand is always in the region of the westerly winds, which, owing to the relative proportion of sea and land in the southern hemisphere, have a greater range than in the northern hemisphere. Climatically, therefore, New Zealand has some claim to be regarded as the antipodes of Britain. The rains are everywhere heaviest on the west coast, but in North Island, where there are no continuous western mountains, the rainfall is fairly uniform over the whole island. In South Island the western slopes of the western mountains have a very heavy rainfall (80–100 inches), while the eastern plains receive less than thirty inches.

Products. Most of North Island and the west of South Island are densely forested. The northern forests produce the kauri pine, which yields a valuable gum. Gum from the kauri forests of remote ages is also obtained by digging over their former sites. In all the New Zealand forests the tree ferns are remarkable for their beauty, sometimes reaching a height of fifty or sixty feet. The eastern slopes and the open lands are covered with grass, or with the abundant New Zealand flax. When first settled by Europeans New Zealand had no domesticated animals, but these have now been introduced. The upland meadows are stocked with cattle, and the drier eastern plains with sheep. The most important pastoral regions are the Canterbury Plains, and the eastern

part of North Island. Millions of sheep are grazed, supplying not only wool, but also fine mutton, which is frozen and exported.

In the Mediterranean region of North Island, the orange, lemon and vine are cultivated. The temperate cereals and fruits are cultivated in the other agricultural regions, and give a very heavy yield per acre.

The mineral wealth of New Zealand is considerable. Coal and gold are abundant. Both are found in the Thames basin of North Island, and in the northern part of the western mountains of South Island, round Westport, Greymouth, and Hokitika. The sands of the Clutha and other rivers of the southern part of the island are dredged for gold.

History. New Zealand was discovered by the Dutch navigator Tasman in the middle of the seventeenth century, and more thoroughly explored by Cook in the eighteenth century. It was inhabited by the fine Maori race, a striking contrast physically and mentally to the Australian aborigines. British colonization began about 1840, and was vigorously opposed by the Maoris, who showed considerable military skill. In recent years the hostility between the two races has vanished, and the Maoris, who have adopted Christianity and a considerable degree of civilization, are admitted to political rights.

The British settlement of New Zealand has proceeded chiefly from three centres, Auckland in North Island, and Christchurch and Dunedin in South Island. Auckland, built on a narrow peninsula, has harbours on both seas, the more exposed and western one being the nearest port to Australia. The neighbourhood yields gold and coal. Auckland was originally the capital, but the remoteness of its position in the extreme north caused the transference of the administrative power to Wellington, which is centrally situated on Port Nicholson, a bay of the North Island, opening from Cook Strait.

South Island was colonized by two distinct waves of settlement. The English centre was Christchurch, on the Avon, a few miles inland. Among the typical English names in the

vicinity are those of Oxford, Lyttelton, the port of Christchurch, and the Canterbury plains, for which Christchurch and Lyttelton are the outlet. Farther north such names as Marlborough, Havelock, Nelson, and Collingwood indicate another group of English influences. Scottish associations are equally marked in the south round Dunedin, founded in 1848 by Scottish Presbyterians. The town is on a fine bay, now made navigable for large vessels as far as Dunedin. The Scottish influence is seen in such names as Port Chalmers, originally the port of Dunedin, Roxburgh, Heriot, Dalhousie, Lowther, and many others. Invercargill has growing saw, woollen, and flour mills, boot and preserved meat factories, and breweries.

PACIFIC ISLANDS.

The Pacific Islands lie mainly between the tropics in the western half of the ocean. New Zealand and one or two small groups and the islands bordering Asia and America are the only exceptions. Most of the groups are arranged along a NW.–SE. axis.

The majority of the islands are of coral origin or of volcanic and coral origin. Only in the New Caledonia, New Britain (Bismarck Archipelago), and the Solomon islands are ordinary crystalline or sedimentary rocks found. The most important of the volcanic islands are the New Hebrides, Fijian, Samoan, Hawaiian, Society (Tahiti), and Marquesan groups.

Climate. The climate is wonderfully equable, and as most of the islands are in the trade wind belt it is fresh, healthy, and pleasant. Where the trades are not felt a more oppressive and unhealthy climate prevails. This is common in the more westerly equatorial islands where clouds and rain are common. The temperature is remarkably uniform, rarely varying 10° between the hottest and coldest months, while the difference between the hottest day and the coldest night

of the average year is not over 20° to 30°. The rains usually fall in summer.

Products. Round the coasts and on the coral islands the coco-nut palm is the chief tree and copra the chief product. The volcanic isles, with a more varied and fertile soil and greater differences of level, have more diverse products, such as sugar, rice, bananas, pineapples, coffee, cotton, and tobacco.

People. The islands are sometimes divided into Melanesian and Polynesian, roughly divided by the meridian of 180°. In the former the black, frizzy-haired Melanesians present a striking contrast to the taller, lighter, wavy-haired Polynesians, of whom the Maoris of New Zealand are a branch.

Political Divisions. The Ladrones, Caroline, Marshall, Bismarck, and Samoa islands are German except two. These are Guam, in the Ladrones, and Tutuila, in the Samoan group, both with good harbours, belonging to the United States, which also possesses the Hawaiian Islands. New Caledonia, Loyalty, Society, Marquesas, Paumotu or Low Archipelago, and other small islands are French. The New Hebrides are under joint British and French control. The rest are British.

New Caledonia is a long mountainous island the size of Wales, rising to over 5,000 feet. It is rich in minerals, especially nickel, cobalt, chrome, antimony, gold, copper, coal, and iron. The older rocks which form the axis of the island do not yield a fertile soil. Stock-raising is one of the chief occupations. In the more fertile soils coco-nut, sugar, cotton, vanilla, coffee and cereals are cultivated. The island is used as a penal settlement by the French. The capital is Nouméa, on an excellent harbour.

The Fiji Islands consist of two large volcanic islands, Viti Levu and Vanua Levu, and numerous smaller ones scattered over the Karo Sea. They are forested. Where cultivated the fertile soil yields good crops of yams (the chief food), banana, breadfruit and many other fruits, sugar, maize, rice, cotton, tobacco, and tea. The capital is Suva on Viti

Levu, a calling-place for steamers between the west of North America, New Zealand, and Australia.

Samoa consists of Savaii and Upolu (German), Tutuila (U.S.A.), and smaller islands. Its products are similar to those of Fiji. Copra and cacao are the chief exports. Its inhabitants are Polynesians, those of Fiji being mainly Melanesians. The capital is Apia on the north or lee side of Upolu. Samo, like Fiji, is occasionally ravaged by disastrous hurricanes.

The Hawaiian Islands were formerly called the Sandwich Islands. The largest island is Hawaii, with two volcanoes, Manua Loa and Manua Kea, both over 13,000 feet. At 4,400 feet on the flanks of Manua Loa is the great crater of Kilauea filled with hot lava. On Maui, the next island, is another great crater some 8 miles in diameter and 10,000 feet above the sea. There are two other large and four medium-sized islands. Of the former the most important is Oahu on which is the port of Honolulu, the calling-place for vessels plying between North America and Asia and Australia. The islands are forested, and yield products similar to those of Fiji, sugar being the most important. The inhabitants are Polynesians, but large numbers of Portuguese, Japanese, and Chinese have settled in the islands. The islands are a territory of the United States.

Historical Note. The Pacific was first seen by Europeans in 1513 (see p. 325). Magellan entered it through the straits which now bear his name in 1520. The most important expeditions to the Pacific were those of Tasman, who discovered Fiji in 1643, Captain Cook (1768–79), who in three voyages first set the limits to the southern ocean and to the east of Australia, and was killed in Hawaii (Owhyhee) in 1779.

The development in recent years of lands bordering the Pacific by Europeans, Japanese, and Chinese has led to the islands becoming of importance strategetically, and except the New Hebrides they are distributed between the British, French, German, and American powers.

THE NEW WORLD.

Configuration of the New World. The configuration of the New World is very unlike that of the Old World. In

FIG. 93. The New World—Highland and Lowland.

the Old World, if we exclude Australia, the main feature-lines run from east to west, and the natural topographical regions coincide more or less closely with those determined by tem-

perature, the subdivisions depending chiefly on the quantity and seasonal distribution of the rainfall. In the New World the feature-lines run north and south, across the temperature belts, and the topographical divisions do not form natural regions.

The configuration of the New World, which consists of the two great continental land masses of North and South America, united by the isthmus of Central America, is very simple in its general outline. The Pacific coast is bordered by a broad lofty belt of mountains. In North America this is known as the Rocky Mountain system, or North American Cordillera, and in South America as the Andean system, or South American Cordillera. These are linked together by the narrow but mountainous region of Central America, which, however, is not a continuation of either. Important breaks occur in the low isthmuses of Tehuantepec and Panama, and in Nicaragua.

East of the Cordilleras are the Central Plains of North and South America, separated by the American Midland Sea, which is known as the Gulf of Mexico in the north and as the Caribbean Sea in the south.

The eastern margin of America is bordered by highlands, which are broken into several masses, giving access to the Central Plains by the breaks between them. In North America, excluding Greenland, the chief masses are (1) the Baffin Highlands in the north, separated by Hudson Strait leading to Hudson Bay, the submerged north-eastern part of the Central Plains, from (2) the Labrador Highlands, separated by the St. Lawrence from (3) the Appalachian Highlands which trend gradually away from the Atlantic, leaving a coastal plain which opens round their southern end to the Central Plains. In South America they are represented by (1) the Guiana Highlands, separated by the broad lowland of the Amazon from (2) the Brazilian Highlands.

The Atlantic margin of the Midland Sea is formed in the north by a chain of mountainous islands connected with the mountains of Central America, and in the east by volcanic or low limestone islands.

NORTH AMERICA.

Natural Regions of North America. Compare the map in Fig. 1 with the list of typical natural regions on p. 1. Greenland and the higher parts of the Arctic archipelago represent the ice-cap or Polar highland type, and the lower parts of the archipelago and the margins of Western Greenland and the North American mainland are of the tundra, or Polar lowland type. Of the cool temperate regions (*a*) the West European type is found along the Pacific from the Alaskan peninsula to the mouth of the Columbia. The Cordillera to the east of this is a variety of (*d*) the Altai, or interior highland type. The Central Plain represents (*c*) the Siberian or interior lowland type. The eastern margin or (*b*) Laurentian type includes Southern Labrador and the Appalachians north of Chesapeake Bay. The warm temperate regions are (*a*) the western marginal or Mediterranean region of California; (*d*) the interior highland or Iran region, including the Great Basin and the Mexican plateau; (*c*) the high dry plains at the eastern base of the southern half of the Rockies, a variety of the Turan, or interior lowland type; while (*b*) the eastern margin or China type of warm temperate lands with summer rains is approximately represented by the south-east United States, from Chesapeake Bay to Mexico. Intertropical regions are represented by the coastal lowlands of Mexico (monsoon type).

Greenland and Arctic North America. The island of Greenland (512,000 sq. miles) is only about 150 miles from Iceland, and about 200 miles from Baffin Land, the nearest and largest island of the Arctic archipelago. This archipelago consists of many islands, separated from each other and from the mainland by straits which are usually closed by ice.

Greenland is a highland sloping from east to west, and varying from 5,000 to 10,000 feet in height. A thick undulating ice-sheet has filled the valleys and covered the mountains, masking the surface features. Great glaciers descend to the sea as lofty ice cliffs from which innumerable icebergs

break off. Both east and west coasts are deeply penetrated by long winding fiords, but, owing to drift ice from the Arctic ocean, those of the east coast are rarely accessible.

The climate is very extreme. The winters are long, dark, and severe, the temperature falling to −50° F., or −60° F. In the short summers shade temperatures of 60° F. are occasionally experienced. The very long, fairly warm summer days give the west coast a green fringe of tundra in summer, a fact which explains the name given to Greenland by its discoverers. Here the reindeer and musk-ox are found, but the chief source of subsistence is the sea, which teems with whales, seals, bears, &c. Some few thousand Eskimo, mostly of mixed blood, manage to exist, moving their tents about the tundra in summer, and building huts of stone or ice in winter. The trade, a Danish monopoly, is in the hands of a few hundred Danish settlers. There are several small settlements, all on the west coast. Upernavik, within the Arctic Circle, is the most northerly settlement in the world.

Lying near Iceland, whose fisheries have long been important, Greenland was settled more than 900 years ago from Scandinavia. Communication with Norway was soon interrupted, and the colonists perished. Six centuries later Greenland was rediscovered by English explorers. The valuable fisheries immediately attracted whalers and sealers in summer. The first permanent European settlement was made by Danish missionaries in the eighteenth century.

The Eastern Highlands. These, like other highlands, form barriers to communication and are settled mainly round their margins. Only in the centre and south is there much internal settlement, chiefly in localities where minerals are abundant.

Climate. The Eastern Highlands are not broad or high enough to shut out all the climatic influences of the interior, and, as in the Old World, the climate is much more extreme than in corresponding latitudes on the western side of the continent. The prevailing winds blow from the land in winter, and, coming more from the north-west than from the

south-west, they are cold and dry. This dry cold weather is often interrupted by less cold rainy winds from the Atlantic, as the north-east winds of the front of the low-pressure systems or cyclones gradually pass into the south-east winds of their rear as the cyclones move onwards. The cyclones follow two well-defined routes, one by the St. Lawrence valley and gulf, and one parallel to the coast. The former cause a larger proportion of the winds from the sea, but their influence is felt mainly in the north. The coastal storms bring rain to the eastern margin.

The Baffin Highlands are snowclad and unexplored, and even their coasts are little known.

The Labrador Peninsula (500,000 square miles) is a highland of the Scandinavian type. The high Atlantic coast is indented with fiords, but the shores of Hudson Bay are for the most part low. The interior is a little-known forested plateau, passing into tundra in the north. The climate is too severe for cereals to ripen, though barley is grown for fodder. The coastal settlements are trading posts or Moravian mission stations. A few hundred Eskimos and half-breeds inhabit the north and west coasts. Wandering Indian tribes hunt the caribou and other animals in the interior. The furs are brought down to the coast, and exchanged for guns and other necessaries. In summer the eastern seas are visited by sealing, cod, and other fishing fleets.

Labrador, like Greenland, was originally discovered by the Scandinavians. In 1500 it was rediscovered by the Portuguese, who hoped to draw from it a supply of slave labour, a fact still commemorated by the name Labrador. The Hudson Bay Company received a charter from Charles II, and France renounced all claims to Hudson Bay by the treaty of Utrecht (1713).

The Appalachian Highlands are part of a great denudation highland, which has been worn down into a series of parallel ridges and valleys. The former are usually formed by the stable base of the downfold, the latter by the less

stable top of the upfold. It may be divided into a northern system consisting of (1) Newfoundland and (2) the Acadian and New England Highlands, separated by the Hudson from the southern system consisting of (3) the Central Appalachians and (4) the Southern Appalachians.

Newfoundland (42,000 square miles). The north and south direction of the ridges and valleys is well seen (1) in the high straight west coast, (2) the range bordering it, which forms

FIG. 94. Newfoundland. The land over 500 feet is shaded.

the north peninsula, separated by Belleisle Strait from the mainland, and (3) in the bays and peninsulas of the east—Placentia Bay, where the submarine cables are landed, and St. Mary's Bay, opening south, and Bonavista, Trinity and Concepcion Bays, opening north. The interior, which is not thoroughly explored, is an undulating plateau of no great height, intersected by innumerable lakes, and drained by many small rivers. The relatively equable insular climate and the

character of the soil are well suited to agriculture, though it is yet little developed. Potatoes, fruits, and some cereals are grown. Little use is made of the forests, which cover much of the interior, or of the mineral wealth, which includes copper, iron ore and coal. The capital is St. John's.

At the present time the wealth of Newfoundland is concentrated in its fisheries, which are the richest in the world. The island was early known to the Norsemen, and was rediscovered at the end of the fifteenth century by Cabot. Its rich fisheries immediately attracted the fishermen of the maritime European nations, who supplied Catholic Europe with dried and salt fish. Newfoundland was settled by Devon men towards the end of the sixteenth century, and by French fishermen, probably Bretons. The possession of Newfoundland was secured to Britain by the treaty of Utrecht, which gave to France St. Pierre and Miquelon, the solitary remnants of her once great possessions in North America. Disputes as to fishing rights continued for two centuries, but were finally settled by arbitration in 1904. The fisheries are carried on in the shallow seas which cover the Grand Banks, a submarine elevation off south-east Newfoundland, about 600 miles long and 200 miles wide. Cold currents from the north bring down small organisms which feed innumerable numbers of fish, cod being the most abundant. The fishing season lasts from June to November, during which months the banks are often covered with dense fogs. Newfoundland fishing-boats also visit the Labrador and other northern fisheries.

The Acadian and New England Highlands. The long narrow Fundy Bay separates the Nova Scotia peninsula from the main mass of these highlands. Its eastern arm, the Minas Basin, penetrates far into the heart of the peninsula, and is remarkable for its high and dangerous tides, which at the equinoxes reach fifty or seventy feet, about ten times as high as at Halifax, on the east coast. The line of the peninsula is continued by the Cape Breton Island, separated by the Gut of Canso, and Prince Edward Island separated by

Northumberland Strait. The sea has everywhere penetrated far into the land, forming an irregular indented coastline, with many capacious harbours. The Bras d'Or, in Cape Breton Island, almost divides the island into two parts, and gives easy access to every part of the island.

West of Fundy Bay the Acadian Highlands form the undulating, densely forested province of New Brunswick, the capital of which is Fredericton, an inland town on the St. John

FIG. 95. Nova Scotia, New Brunswick, Prince Edward's Island, and the eastern parts of Quebec and Maine. The land over 500 feet is shaded, that over 2,000 feet is black.

River. On the south they pass into the two parallel belts of the New England Highlands, (*a*) the White Mountains in the east, bordered by a narrow coastal plain and separated by the Connecticut valley from (*b*) the Green, Hoosac, and Taconic Mountains in the west, beyond which is the Hudson.

The core of the Acadian Highlands consists of old crystalline rocks, which have been heavily glaciated. The minerals

include iron and coal. Coal is worked at Cumberland and Pictou in northern Nova Scotia, and at Sydney in Cape Breton Island. The greater part of the region is forested. Lumbering is important in the interior and shipbuilding on the coast, which has many excellent harbours and rich fisheries. Agriculture is developing. The plains round Fundy Bay are engaged in dairy-farming. The fertile valley of Annapolis in southern Nova Scotia is famous for apple orchards. Prince Edward Island is also a flourishing agricultural region, of which Charlottetown is the capital.

Halifax, on the east coast of Nova Scotia, with a magnificent harbour, and St. John, in New Brunswick, on the tidal estuary of the St. John river which enters Fundy Bay, are terminal ports of the Canadian Pacific Railway. They are specially important in winter, when the St. Lawrence ports are closed. It is now proposed to make Gaspé, at the southern end of the Gaspé peninsula, another terminal port.

Acadia was settled by the French at the beginning of the sixteenth century. They were almost immediately followed by Scottish settlers, who gave its name to Nova Scotia. France renounced Acadia by the treaty of Utrecht, but the Acadian sympathies remained so strongly French that many French settlers were deported in the middle of the eighteenth century. The union with the Dominion of Canada took place in 1867.

New England. New England resembles Acadia in natural conditions, but is at a much later stage of economic development. An indented coast is backed by a rugged forested interior. This led to the early development of fisheries and local shipbuilding, and later to extensive trade, as the small fishing centres developed into ports, such as Portland (Me.), a terminal port of the Canadian Pacific Railway. The rivers which descend from the highlands supply cheap power, giving rise to various manufactures. Cotton is cheaply procured from the South Atlantic ports, and the cotton manufacture has developed at Manchester (N.H.), Lowell (Mass.), on the Merrimac, Providence (R.I.), and Fall River (Mass.). Fall

River has typical advantages. A fall of 130 feet in half a mile supplies power, while the harbour admits the largest vessels (see Figs. 95 and 96).

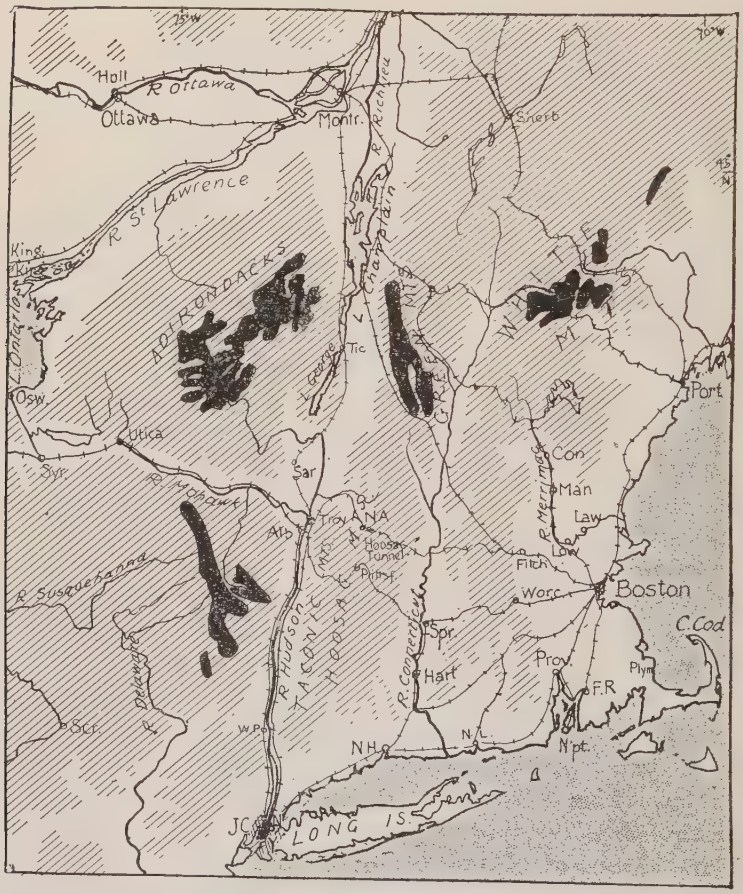


FIG. 96. The western part of New England and the Hudson, Mohawk, and Richelieu Valleys. The land over 500 feet is shaded, that over 2,000 feet is black.

Manufactures are not solely dependent on water power. Coal is brought from the Pennsylvanian Appalachians, and manufactures have developed all over New England. Worcester

and Springfield (Mass.) manufacture every kind of machinery. Hartford (Conn.) is similarly employed, and is also a market for the fine tobacco of the fertile Connecticut valley. The largest city of New England, Boston, the capital of Massachusetts, is important as a port, a manufacturing town, and an intellectual centre.

New England was settled in the seventeenth century, by English Puritans, mainly from East Anglia (see p. 125). In 1643 Massachusetts Bay, Plymouth, Connecticut and New Haven styled themselves the United Colonies of New England. Settlement spread from the coast up the valleys, the advance inland leading to long Indian wars. The route to the west was barred by the parallel north and south ranges, which were not crossed till the nineteenth century. The railway routes to the west are all difficult, the Hoosac Tunnel through the Hoosac Mountains being the longest in the United States ($4\frac{1}{2}$ miles).

In the eighteenth and early nineteenth centuries Boston ranked after Philadelphia as the second city of the United States. Both are now far surpassed by New York and Chicago. New England still retains the intellectual leadership, and is the seat of the universities of Harvard (Boston) and Yale (New Haven). Its agricultural prosperity has suffered by the opening up of the west, but this has led to more rapid industrial development. A large influx of Irish and French Canadian factory hands has considerably modified the old Puritan type, which is still preserved in remoter villages.

The Central Appalachians and their Margins.—The coastal margin of the Central Appalachians has three important openings: (1) the Hudson Valley, protected by Long Island, leading across the highland barrier to the Great Lakes, (2) the wider Delaware Bay and River, and (3) the still wider and longer Chesapeake Bay, leading to the Susquehanna Valley.

In the Central Appalachians the well-marked system of parallel ridges and valleys is very difficult to cross. The

Delaware, Susquehanna, and other rivers give access to the Appalachian Valley which lies behind the eastern ridges. Until their narrow gaps were followed by railways they were of little use as routes to the Appalachian plateau, which rises on the western edge of the Appalachian Valley and slopes gradually west, unbroken by parallel ridge and valley. This distinction between the Appalachian ridges to the east and the Appalachian

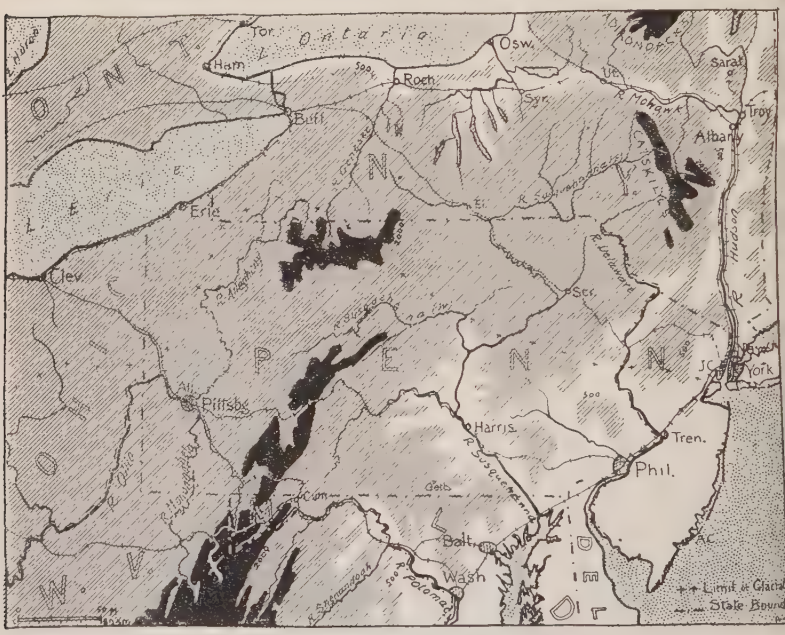


FIG. 97. The Central Appalachians and their Margins. The land over 500 feet is shaded, that over 2,000 feet is black.

plateau (sometimes termed the Allegheny plateau) to the west of the Appalachian Valley must be clearly understood.

The wide eastern lowlands, more fertile than those of the north-east, were settled by a population composed of many different elements. The Dutch founded New Amsterdam and other trading posts on Manhattan Island, at the mouth of the Hudson, and pushed up the river. They were followed by

the English, who took New Amsterdam and renamed it New York. Expansion up the Hudson towards the St. Lawrence involved hostilities with the French, who were following that route, and with powerful Indian tribes. The Delaware route was followed by Quaker and other fugitives from the religious persecutions of Charles II and James II. Philadelphia, on the Delaware, immediately became important, and played a leading part in early colonial history. Pennsylvania, the colony of which it formed the nucleus, received a large influx of Germans from the Palatinate, whose descendants form the Pennsylvanian Dutch. The Chesapeake and Susquehanna route was followed by Roman Catholic settlers, who named their colony Maryland, in honour of Queen Henrietta Maria. The capital, Baltimore, at the head of a tidal estuary opening to Chesapeake Bay, was not founded till a century later.

The Episcopalian settlement, royalist in sympathies, was chiefly in Virginia, which was named by Raleigh after the Virgin Queen. It had access to the interior by the Chesapeake, Potomac and James rivers. Richmond, on the James, at the head of tidal navigation, the capital, was founded early in the eighteenth century.

At the close of the War of Independence with the mother country, a Federal Capital became necessary. To avoid jealousy it was resolved to build one. The site chosen was the head of tidal navigation on the Potomac, where Washington was founded in 1800. The surrounding country (sixty square miles), ceded by Maryland and Virginia, became the District of Columbia, a Federal Territory, independent of any state control.

These five cities, New York, Philadelphia, Baltimore, Richmond, and Washington, each with its special geographical and historical significance, are the chief centres of the Central Appalachians. Their prosperity originally depended on that of the agricultural and maritime colonies. Though this suffered as the virgin lands of the west were opened up, the Atlantic centres increased in importance as links between

the west and the Atlantic. As in New England agricultural competition stimulated the industrial development of the east, and manufactures and trade are now more important than agriculture. New York rapidly outstripped its rivals, and is to-day the second city in the world.

New York, originally built on the narrow Manhattan Island, now includes Brooklyn, on Long Island, and many other towns. The political division between the states of New York and New Jersey technically excludes Jersey City and others west of the Hudson, though these really form part of Greater New York. The population within a radius of thirty miles from New York City Hall is between five and six millions.

FIG. 98. Greater New York, in New York State, and Jersey City, Newark and other New Jersey cities in immediate vicinity. Black indicates areas built over.

N.B. The cities east of the State boundary form Greater New York.

The rapid growth of New York is due to its command of land and sea routes. The opening of the Erie Canal, connecting it with Buffalo, on Lake Erie, by the valleys of the Hudson and its tributary the Mohawk, gave it its first great impetus, and made it the outlet for a large and rapidly developing hinderland. The construction of a railway up the Hudson and the establishment of steam communication with Europe further centralized the commerce of east and west at New York.

Many railways now cross the Appalachians but the heavy gradients counterbalance the shorter distance, and the Hudson route is still the most important. Hardly less important than

the route west by the Mohawk to Lake Erie is that north by the main valley to Lake Champlain and the St. Lawrence. Albany, where these routes diverge at the head of tidal navigation, is an important junction, and a receiving and distributing centre for the produce of the northern forests and the western plains (cf. Figs. 96 and 97).

New York is also the outlet for important industrial districts. Coal is abundant in the Central Appalachians. The anthracite or hard coal of the east led to the rise of Scranton and Harrisburg in the Appalachian valley and of many other centres. The west is rich in soft coal and petroleum, and Pittsburg, on the Upper Ohio, is the centre of one of the greatest industrial regions in the world. Except in relation to New York and other eastern ports, which form its outlets, it belongs rather to the central than to the Appalachian region.

Philadelphia as a port is far behind New York, though hardly less important industrially. Its leading industries, which are fed by the anthracite coal of Eastern Pennsylvania, are the manufacture of locomotives and shipbuilding.

Baltimore has several important manufactures, including cotton and iron. It is the northern port of a rich region, where cotton becomes a staple product.

Richmond is the chief city of the Southern States, the key to the southern coastal plain, and the great tobacco market of the south.

All these cities are at the tidal head of navigation (cf. Fig. 99). Trenton, similarly situated on the Delaware, manufactures fine pottery from local clay and has many mechanical and engineering industries.

The possession of the region between the Hudson and the James secures the possession of the whole coastal plain. In the War of Independence everything turned on the possession of the Hudson route. The control of this by the British would have cut off New England from the other insurgent colonies and would have enabled the British troops on the St. Lawrence to co-operate with the forces invading from the coast. The

victory of the colonists at Saratoga Springs gave them the control of the Hudson and of New York, and through New York of the Chesapeake and other keys to the eastern plain.

The Southern Appalachians and their Margin. The parallel ridges and valleys are well marked in the Southern Appalachians, which are higher, broader, and a much more formidable barrier than the Central Appalachians. The

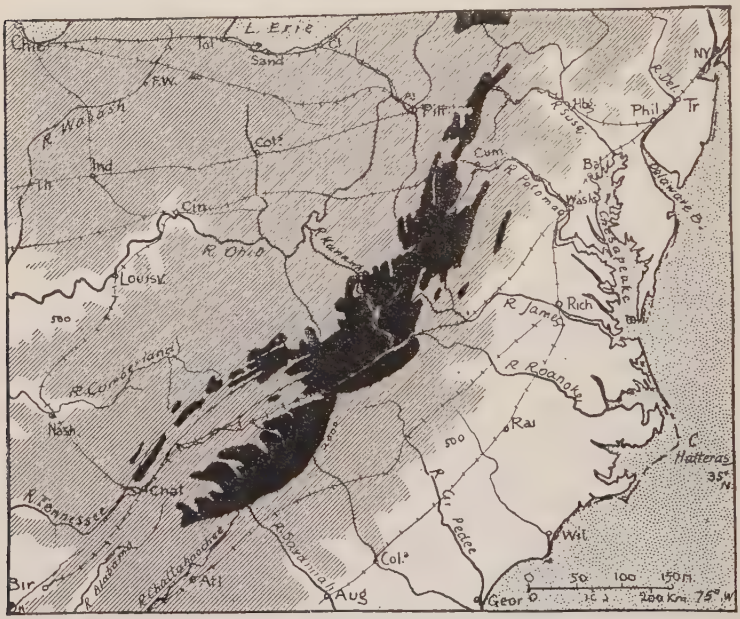


FIG. 99. The Routes across and through the Appalachians. The land over 500 feet is shaded, that over 2,000 feet is black.

eastern margin of the Appalachian Valley is formed by the Blue Ridge and its continuation the Black Mountains of North Carolina, which culminate in Black Dome (6,700 feet), the highest mountain east of the Western Cordilleras. The western wall of the Valley is formed by the Appalachian plateau, rising in the steep escarpment of the Cumberland plateau. Across this plateau the Tennessee, which drains the Appala-

chian Valley to the south, breaks to the Ohio. Long parallel rivers flow from the Blue Ridge south-east to the Atlantic, forming falls where they leave the harder rock for the fertile Eastern Valley. Along this line, where navigation is inter-

FIG. 100. The Appalachians, the Appalachian Plateau to the west, the Ohio and Mississippi Valleys and the Gulf and Atlantic Coastal Plains. The land over 1,000 feet is shaded, that over 2,000 feet is black.

rupted and power becomes available, Raleigh (N.C.), Columbia (S.C.), Augusta (Ga.) and Montgomery (Ala.), are engaged in manufactures, including cotton. The Eastern Valley runs parallel to the coast, and is separated from it by sandy forested

heights which yield timber and turpentine. The coast itself is low and fringed in the north with lagoons and sandspits, the easternmost of which forms Cape Hatteras. Farther south the famous sea-island cotton, exported from Charleston (S.C.) and Savannah (Ga.), is grown on the coastal islands.

Agricultural labour in the southern lowlands is very exhausting for whites. Early settlement was of the plantation type, consisting of large estates on which cotton, sugar and tobacco were grown by negro slaves. In the northern states, where the climatic conditions were different, slavery was unnecessary and unpopular. Nearly half a century ago the southern states, believing that their right to control their internal affairs was endangered by this feeling, seceded from the Union. Fighting took place (1) on the coastal margin from Philadelphia to Richmond, (2) in the parallel Appalachian Valley, reached from the east through gaps, and (3) in the Mississippi Valley, which controlled routes from the north to New Orleans, the chief outlet for the southern states west of the Appalachians. Chattanooga, on the Tennessee, at the end of the Appalachian Valley, commanded routes from east and west, and was a place of great importance in the struggle.

The Central Plain. It is possible to pass from the Arctic Ocean (lat. 70° N.) to the Gulf of Mexico (lat. 30° N.) through 40° of latitude, or nearly 2,800 miles, by the Mackenzie, Red and Mississippi rivers, without rising much over 1,000 feet in elevation. From this the land rises west to the Rockies, and in the south centre east to the Highlands, without the character of the plain being broken. Such diversity as exists is due to (1) the nature of the soil, (2) the kind of weathering, and (3) the occasional occurrence of higher ground, as in the Black Hills of Dakota and the Ozark Hills of Missouri and Arkansas.

As in the Russian plain the sedimentary rocks lie horizontally round a low, gently undulating area of old rock, with a chain of lakes round the margin (Great Slave, Bear,

Winnipeg, and the Great Lakes of the St. Lawrence Basin). Hudson Bay in the centre may be compared with the Baltic in Russia. Beyond the chain of lakes is a morainic fringe of heights, with no general name, but comparable to the Baltic Heights. Beyond these low heights is a region of loess, or wind-formed soil, loam, and alluvium in the river valleys.

FIG. 101. North American Rivers. Notice particularly the basins in the Central Plain.

The Central Plain consists of four basins, the Peace-Mackenzie, draining north, (2) the Saskatchewan-Nelson, flowing to Hudson Bay and draining the west part of the centre, (3) the St. Lawrence, draining the east part of the centre to the

Atlantic, and (4) the Missouri-Mississippi draining south to the Gulf of Mexico. The first three filter through lakes but the Mississippi lies outside the great lake region.

All four rivers are great waterways, but each has its special disadvantage. The Peace-Mackenzie flows to a frozen sea of no value as a means of communication. Hudson Bay, to which flows the Saskatchewan-Nelson, is frozen except for three months of the year, while the St. Lawrence Gulf is closed by ice for over four months in winter. The Mississippi, like the Hwangho, flows in its lower course over shallow deltaic lands, where the river is difficult to regulate. Prevented as far as possible by *levées*, or embankments, from flooding these lowlands and thus disposing of the silt it carries the river has gradually raised its bed above the level of the surrounding country, and its distributaries are with difficulty kept deep enough for navigation (see p. 311).

The Peace-Mackenzie and the Mississippi, which flow north and south, cross more zones than the other two systems, the general direction of which is from west to east. Most of those crossed by the Mackenzie, however, are of little economic importance. Owing to the absence of natural barriers none of the four basins forms a natural region. The divisions are climatic, but, as in the configuration, the transition is extremely gradual.

Climate. The Rocky Mountains exclude all western oceanic influences from the Central Plain just as the Himalayas exclude northern climatic influences from India. The Eastern Highlands exclude the Atlantic influences, but not so completely, as they are lower, narrower, and less continuous. In the north all the land west of them may be included in the continental area. Hudson Bay and the Great Lakes cause only slight and local modifications. In the south, the Gulf of Mexico causes the Atlantic oceanic influence to be felt far inland. The direction of the winter storms, along the Great Lake and the St. Lawrence, or along the western margin of the Appalachians, also causes an indraught of warm moist

winds from the south, bringing winter rains to the region between the Gulf and the Great Lakes.

The Northern Lowlands have (1) cold winters, with high atmospheric pressure and outflowing dry winds, and (2) warm summers which grow longer and warmer from north to south, with low atmospheric pressure, inflowing winds, and local storms causing summer rains. In winter there is little precipitation and the ground is deeply frozen. Spring is the

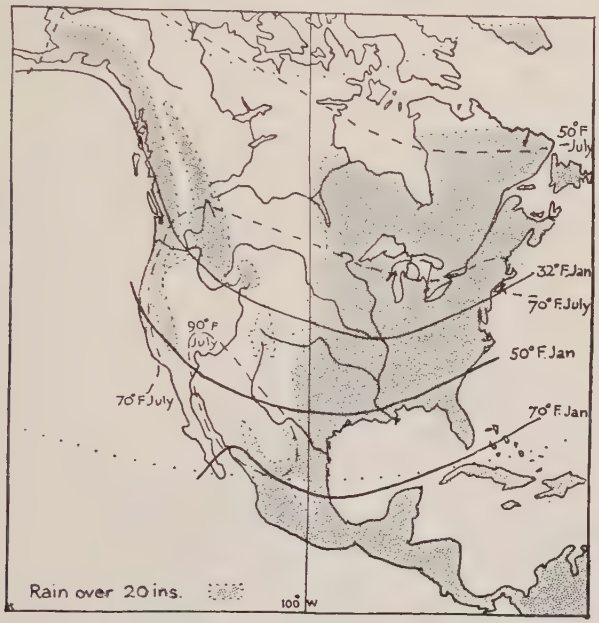


FIG. 102. Climatic Divisions of North America.

season of thaw, the early summer of rains, and the autumns are dry with early frosts.

The Southern Lowlands have also an extreme climate, with a very variable winter climate. Cold blizzards from the north-west may alternate with warm spells from the south, so that enormous ranges of temperature may be recorded within a brief period. Owing to the absence of natural climatic

barriers the winter frosts are felt far south, and the period between the last frost of spring and the first frost of autumn sets the limit to the cultivation of cotton. The summers are much longer, hotter, and wetter than in the north and are occasionally troubled by violent tornadoes.

The Western Plains have the extreme and more regular temperature of the north, as the higher elevation neutralizes the lower latitude. The rainfall is very scanty, owing to the great distance from the sea. Near the base of the mountains the chinook wind, or American foehn (see p. 67) leads to a rapid melting of the snow.

The natural divisions of the Central Plain are exhibited in the vegetation which is largely controlled by these climatic conditions.

The Northern Lowlands consist of tundra or 'barren lands' in the extreme north, succeeded to the south by forests, which pass on the south and west into the wheat belt. The Western Plains consist of more arid bad lands, and of less arid pasture land. The Southern Lowlands consist of the maize belt in the area liable to severe winter frosts, and of the cotton belt in which these are absent for nearly eight months in the year.

The Tundra or Barren Grounds. The tundra of North America has the typical long, cold, dark winter, when all growth ceases, and a short, warm, light summer, when it is relatively rapid. The vegetation has already been described (see p. 2). The caribou is the American reindeer, but it has not, as in the Old World, been domesticated. Hence population in the Barren Grounds is even scantier than in the tundra of the Old World, and depends wholly on the hunting of the many fur animals which move north in summer, or on fishing.

The Forest Belt. The forest belt runs west-north-west and east-south-east. It almost covers the basins of the Mackenzie, Lower Nelson and St. Lawrence, and a small part of the eastern basin of the Upper Mississippi.

The Mackenzie rises as the Athabasca near Mount Columbia, and flows north-east to the lake of that name, whose surplus

waters it carries off. Emerging from the lake it is known as the Great Slave River and receives the Peace, which has followed an almost parallel course. It flows north to the Great Slave Lake, below which it is called the Mackenzie. It receives the Liard from the Rockies and a tributary from the Great Bear Lake to the east and forms a river nearly a mile in width which enters the Arctic Ocean by a delta of considerable size. The lower course is frozen for three quarters of the year.

The Northern Saskatchewan, one of the head streams of the Nelson, rises in the glaciers of the Rockies at no great distance from the Athabasca. Farther south is the South Saskatchewan, which unites with the North Saskatchewan and then flows east to Lake Winnipeg. Below this great lake it is called the Nelson, and flows north-east to Hudson Bay. The forests which cover much of its basin are as yet little used for lumbering, and form a great reserve for the fur-trapper and trader. Communication in summer is carried on by bark canoe on the innumerable streams and in winter on snow-shoes. To Lake Winnipeg flows the Red River of the north, which is thus in a sense a tributary of the Nelson. Its basin, which forms one of the richest wheat lands in the world, will be described with the steppe wheat belt.

The whole basin of the St. Lawrence and much of the region south of the Great Lakes is also densely forested.

The St. Lawrence and the Great Lakes. The St. Lawrence rises as the St. Louis River, which carries to Lake Superior the waters of many small lakes. Lake Superior, the largest fresh-water lake on the globe (32,000 square miles), lies about 600 feet above sea-level in a great rock basin which was probably much deepened during the Ice Age. Before that period its waters probably flowed to the Mississippi. It is discharged at its eastern end by the short St. Mary's River to Lake Huron. This river contains many islands, and at Sault Sainte Marie, or the Soo, it is obstructed by rapids which are avoided by ship-canals. Lakes Huron (23,000 square

miles) and Michigan (22,500 square miles) are really one great lake, 581 feet above the sea, and only 8 feet above Lake Erie (10,000 square miles), with which Lake Huron is connected by the Detroit River. The waters of Lake Erie are discharged to Lake Ontario, the lowest and smallest of the Great Lakes, by the Niagara River which falls 326 feet in its course of 35 miles. Half of this descent is accomplished by the great leap over Niagara Falls, where the broad river is separated by a small island into the Canadian or Horseshoe Fall (3,000 feet wide, 158 feet high) and the

FIG. 103. The Great Lakes of North America and the St. Lawrence and Ottawa Rivers. Cf. Figs. 100, 104, and 105.

American Fall (1,060 feet wide, 167 feet high). The formation of the cataract and of the long gorge below has already been explained (*Prelim. Geog.*, p. 20). Below the falls the river continues to descend rapidly by a series of rapids. These obstructions are avoided by the Welland Canal. Ontario (7,250 square miles, 250 feet above sea-level) unlike the other lakes, is never completely closed by ice, but freezes only near the shore. It is discharged by the St. Lawrence, the second river in the world in volume. The St. Lawrence issues from Lake Ontario in a broad expanse known as the Lake of the Thousand

Isles, below which it narrows, and forms many falls and rapids. The lowest of these are the Lachine Rapids, avoided by the Lachine Canal, immediately below which is the island of Mount Royal, where the Ottawa enters the St. Lawrence from the north. A few miles lower down, the Richelieu River, from Lake Champlain, enters on the right bank, forming a route across the Appalachian barrier to the Hudson and New York. The St. Lawrence, which is here only a few feet above sea-level, expands into the shallow Lake St. Peter. The river which flows out of this widens below the rock of Quebec to a long deep estuary at the mouth of which is the wooded island of Anticosti. This estuary represents a drowned river valley, which has been traced along the floor of the sea between Newfoundland and Cape Breton Island to the edge of the continental shelf.

New France. The St. Lawrence was the gate by which the French penetrated into North America and founded New France. It formed an easy route to the interior across that Appalachian barrier which long penned in the British colonies farther south. Two great names are associated with the exploration of this route. Cartier ascended the St. Lawrence as far as the Lachine Rapids in 1535. Champlain, at the beginning of the seventeenth century, founded Quebec on its Gibraltar-like heights and pushed exploration up the various waterways into the interior. A vast domain was rapidly opened up, but this was only thinly peopled by fishers and fur-traders. Thus while the English colonies of the Atlantic seaboard became firmly rooted to a limited area, France, with greater facilities for movement, was but loosely attached to a vast domain of river and forest. Such colonization is unstable, and the capture of Quebec in the middle of the eighteenth century involved the loss of the whole of Canada.

Quebec and Montreal. The two original French settlements still retain their importance. Quebec, though not the largest town, is the capital of the Province of Quebec, formerly called Lower Canada, to distinguish it from the English-

speaking colony of Ontario or Upper Canada. Built on the edge of the heights of the left bank, with the commercial city round its base, it is the best example in North America of a type of city familiar in the Old World, one whose site was determined primarily by ease of defence. The inhabitants both of the city and of the province are largely of French descent, and speak French.

Montreal, the chief port and commercial centre of the St. Lawrence, is built on the island of Mount Royal (Mont Réal), where many routes converge to the river at its highest navigable point. Of these the most important are those by the Ottawa to the north, to Georgian Bay, an arm of Lake Huron, by the Richelieu to the Hudson, and by the St. Lawrence to the Great Lakes and the Mississippi. Montreal was first important as a fur-trading centre, and it has grown with the growth of wider economic relations. It is above the tidal limit, but has been rendered accessible to the largest vessels by the deepening of the channel. A series of canals avoid the various rapids, and give through water communication with Chicago at the southern extremity of Lake Michigan, and Duluth at the western end of Lake Superior, the two great inland ports of the St. Lawrence.

Modern Eastern Canada. The natural wealth of Canada consists primarily of its rich fisheries and of the furs and timber of its forests. The timber or lumber centres are Quebec and Hull on the Ottawa, at the foot of the Chaudière Falls, which supply power for innumerable saw and pulping mills. The fur trade is important throughout the forest regions of Quebec and Ontario, and has its great market centre at Montreal. The importance of the fisheries on the coasts of Labrador, Nova Scotia, and Newfoundland has already been described.

Agricultural Eastern Canada is a clearing in the vast forest. The most fertile region is the Lake Peninsula of Southern Ontario, with a climate which brings all fruits to perfection. Unable to compete in wheat-growing with the newly-settled

West, the farmers of Eastern Ontario have paid special attention to mixed and dairy farming, and to the cultivation of the vine, peach, and other fruits in the Lake Peninsula. The chief centres are Toronto, where the route from Georgian Bay reaches Lake Ontario, Hamilton, and Kingston, ports on Lake Ontario, and Ottawa, the Dominion Capital. Eastern Ontario is separated from the agricultural lands of the west by the broad forest belt of Western Ontario, which is not yet opened

FIG. 104. The more densely peopled parts of Quebec and Ontario. The land left white is under 500 feet, that with a light shading between 500 and 1,000 feet, that with a dark shading between 1,000 and 2,000 feet, and that black over 2,000 feet.

up. A similar forest belt to the east separates it from maritime Canada. It is least isolated on the south, where Lakes Erie and Ontario unite it closely with the United States.

Among the growing industries is mining. Vast deposits of iron, copper, and other ores occur round Lake Superior, especially in the United States. These are cheaply carried by water to the furnaces of Chicago, Toledo, Cleveland, and inland to Pittsburg. Silver is found in Ontario.

As in the Eastern United States, the agricultural competition

of the West has stimulated the industrial development of the East. Montreal, which has special facilities for obtaining raw materials and procures cheap power from the Lachine Rapids, carries on very varied industries. Cotton, sugar, and tobacco represent imports from the West Indies and the Southern United States. Foundries and the manufacture of locomotives, machinery, and hardware, indicate the combination of cheap power and proximity to mining districts. Distilleries, breweries, and flourmills work up the produce of the agricultural west. The cattle ranches of the Far West supply raw materials for the manufacture of boots, shoes, and candles, and the forests of Quebec and Ontario those for sawmilling and paper-making. Quebec has less varied industries. The forests supply tanning materials, and the Far West the hides for the important leather manufactures. Cotton is also manufactured.

Routes. The chief route to the south, by Lake Champlain, Albany, and the Hudson, has already been described. The main route to the west is by the Canadian Pacific Railway (C. P. R.). This runs from Halifax and St. John, the winter ports, to Quebec and Montreal, the summer ports. From Montreal it follows the Ottawa River to Ottawa, and then runs through the forest to the nickel mines of Sudbury, and on to Port Arthur and Fort William on Lake Superior. Thence it runs west by Winnipeg through the agricultural and pastoral regions of the Central Plain (cf. Figs. 95, 96, 103 and 104).

Grass Lands and Open Woods of the Western Plains. Agriculture in Eastern Canada and the United States round the Great Lakes involves as a preliminary the clearing of the forest. This region, therefore, was relatively slowly settled. West of the forest belt lie the open woods and grass lands of the Middle West, where this initial labour is unnecessary, and where the soil is extraordinarily fertile. This region, both in Canada and the United States, has been rapidly opened up during the last half century.

The parallel of 100° W. roughly divides the agricultural

plains from the drier pastoral west, which can only be cultivated under irrigation. The agricultural lands east of 100° W. are cultivated with wheat in the north as far south as 42° N., with maize between 42° and 37° N., and with cotton south of 37°. The wheat belt includes much of the Saskatchewan, Nelson, and Upper Mississippi basins. The maize and tobacco belt includes much of the Lower Missouri, the Middle Mississippi, and the Ohio basins. The cotton belt includes the Lower Mississippi and the Gulf and South Atlantic coastal plains.

The Wheat Belt. The wheat belt in Canada includes Manitoba, and the eastern parts of Assinoboia and Saskatchewan, and of North and South Dakota and Minnesota in the United States. Wheat is also grown along with maize in Kansas, Nebraska, Ohio, and Indiana. The most fertile part of the wheat belt is the valley of the Red River, a broad plain, from thirty to thirty-five miles wide, which was once the floor of an old glacial lake, now represented by Winnipeg and Winnipegosis.

The climate is extreme, with cold dry winters and warm summers. A rainfall of one inch is equivalent to a snowfall of nearly a foot, so that enough snow falls in winter to prevent the soil from freezing to any great depth. The spring thaws thoroughly moisten the soil, the summer rains fall when they are needed to swell the ears, and the warm summers ripen the grain. The farms are of large size, and the level character of the country allows labour-saving machinery to be extensively used.

The towns are storing and milling centres. The largest in Manitoba is Winnipeg, where in harvest twenty miles of sidings are filled with trains to carry the crops east. Brandon is also a busy centre.

The chief city in the United States wheat belt is Minneapolis, at the St. Anthony Falls of the Mississippi, which supply power. It is the greatest flourmilling centre in the world, and has also an immense lumber trade. Together with

St. Paul, at the head of the Mississippi navigation, it forms a great double city, with many manufactures. Milwaukee, on Lake Michigan, the second milling centre, uses enormous quantities of grain in its breweries. Wheat is shipped from Duluth by the Great Lakes and the St. Lawrence. Duluth

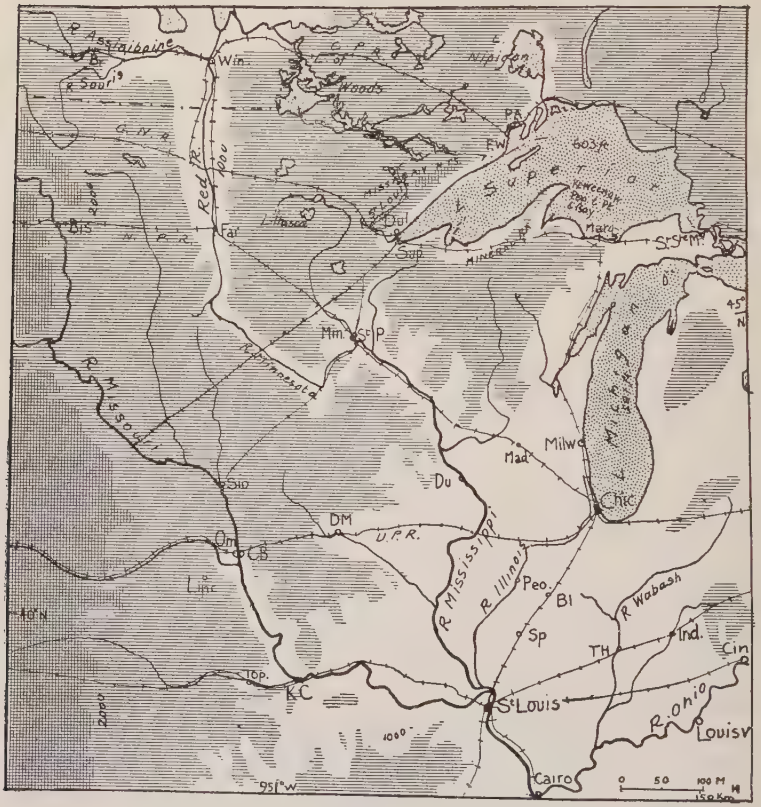


FIG. 105. The Central Portions of the Wheat and Maize Belts. The land over 1,000 feet is shaded, that over 2,000 feet is the most darkly shaded.

is also the outlet for the stock-raising grass lands of the west and for the mineral regions round Lake Superior.

The development of the wheat belt is due to the extension of railways, which carry settlers west and produce east. Fifty

years ago Minneapolis, which now has a quarter of a million people, had only five hundred. The growth in Canada is still more recent. Twenty-five years ago Winnipeg was little more than a village. The scarcity of labour in a new country, and the cost of transporting harvests to the nearest station, still limit settlement to the immediate neighbourhood of the railway. Every extension of the railway is followed by an extension of the farming area, and this is proceeding so rapidly that each year Canada becomes a more important source of wheat. A new transcontinental line, north of the Canadian Pacific, is being built to tap the north of the wheat belt. It will follow the route by the Peace River, by which the Northern Pacific was first reached at the end of the eighteenth century. The terminus is to be called Prince Rupert (see Fig. 107).

The Maize Belt. In the maize belt the summers are sufficiently long and warm to ripen maize, or corn, as it is called. A great variety of other crops are grown, including wheat, oats, barley, buckwheat, roots, and tobacco.

Iowa, Illinois, Kansas, Nebraska, Missouri, and Indiana lead in growing maize. To reduce the cost of transport this is largely used to fatten hogs, which are slaughtered and 'packed', or 'canned', at Chicago, Cincinnati, Indianapolis, St. Louis, Kansas City, Omaha, and other large route centres.

Settlement reached this region by the Great Lakes and the Ohio River. In the course of the eighteenth century forts and trading posts were established at suitable sites, many of which have developed into great cities. Among the oldest is Detroit, founded by the French in 1701. Fort Duquesne, on the site of the modern Pittsburg, where the Monongahela and Allegheny rivers unite to form the Ohio, was established by the French in 1754. Here routes converge (1) from the coast by the Potomac and the Monongahela; (2) from Lake Erie, by the Allegheny river; and (3) from the Gulf of Mexico by the Mississippi and the Ohio. Fort Duquesne was taken by the English in 1758, and named after Pitt, the Prime Minister. Pittsburg has developed into the greatest iron-manufacturing centre of the United States

because of the abundance of coal, natural gas, and petroleum in the neighbourhood. Local ore was first smelted, but this is now quite inadequate, and much is brought from Lake Superior to Cleveland and other Lake Erie ports. The growth of Pittsburg has been much accelerated by its natural command of routes in all directions. In 1764 St. Louis, at the confluence of the Missouri and Mississippi, now the centre of many converging waterways and railway lines, was founded as a fur-trading post. Chicago, early visited by French explorers, was a trading post (Fort Dearborn) at the beginning of the nineteenth century. Its position at the southern end of Lake Michigan, which stretches far south into the Central Plain, makes it the centre to which many routes from east and west converge. A very low divide, now crossed by a canal, separates it from the Illinois and the Mississippi. Thus it is also the point at which routes from the Gulf reach the Great Lakes. It became a city in 1837, when its population was just over 4,000. Its population now is little short of 2,000,000. It is the great market to which are consigned the cattle of the western grass lands, the hogs of the maize belt, the grain of the agricultural prairies, and the lumber of Michigan and Wisconsin. Its slaughtering and canning industries are on an enormous scale. Coal is cheaply obtained from the Illinois coalfields, and iron from Lake Superior. Locomotives and railway plant for its vast railway traffic, and agricultural machinery for the development of the agricultural west, are among the products of its immense steel and iron industry.

The eastern plains, especially on the western margin of the Appalachians, which fifty years ago were hardly opened, and which twenty-five years ago were still mainly agricultural, are rapidly becoming industrial. Coal is widely distributed, raw materials of all kinds can be cheaply obtained, and both eastern and western markets are easily accessible. Cincinnati (O.), on the Ohio, once exclusively a provision centre, has now 8,000 factories engaged in making locomotives, machinery, and every form of steel and iron goods; waggons, and every

kind of carriage; furniture, and every kind of wooden article; boots, shoes, and every kind of clothing; breweries, distilleries, potteries, fertilizer and manure works, soap works, and others too numerous to mention. It is also a great grain, iron, and horse market, and the converging point of many lines of rail. Louisville (Ky.), lower down the Ohio, the great market for leaf tobacco, has similar industries. Indianapolis, in a region of natural gas and petroleum, is similarly engaged. Other growing centres are Cairo (Ill.), where the Ohio joins the Mississippi, and Nashville (Tenn.).

The Cotton Belt. The cotton belt extends from the Atlantic Ocean to the middle of Texas. Texas, Georgia, Mississippi, and Alabama lead in the production of cotton, which is also grown in the Carolinas, Florida, Louisiana, Arkansas, Indian Territory, and Oklahoma. Rice is grown in the coastal belt.

Most of the cotton belt is a low-lying alluvial region, bordered along the coast by sandspits enclosing lagoons. Some of these are of what is called the *liman* type, the lagoon being at right angles to the trend of the coast, as at the mouth of the Alabama and Trinity rivers. The Mississippi forms a great delta, intersected by distributaries called *bayous*. Below the confluence of the Ohio its bed is above the level of the surrounding country and is protected by embankments or *levées*. Disastrous floods occur in the Lower Mississippi in spring, when the melting snows swell the upper tributaries. Thousands of square miles, cultivated with sugar and cotton, are sometimes inundated, and so great is the damage done that a special department has been organized to observe the rise of the waters in the upper part of the basin and predict the probable rise in the lower basin. In its lower course the river frequently changes its direction, either by eating away its banks, or by cutting across a peninsula enclosed by a loop in its course (see *Prel. Geog.*, p. 14).

The climate is hot in summer and warm in winter, with occasional cold spells. Rain falls at all seasons. Cotton does

best on low-lying lands, which must not be too moist. A variety which will grow on higher ground is cultivated to the height of 1,000 feet in Texas.

The cotton ports are Pensacola (Fla.), Mobile (Ala.), New Orleans (La.), and Galveston (Tex.). Cotton is exported chiefly to England and New England. The cotton manufacture is rapidly developing at the base of the Southern Appalachians from Southern Virginia to Central Alabama, and more especially in the Carolinas. In addition to cheap water-power coal is abundant. Birmingham (Ala.) is the centre of a coal and iron-mining district, and has large iron and cotton manufactures. Memphis, the largest town on the Mississippi between St. Louis and New Orleans is an important cotton market and manufacturing centre. Vicksburg, lower down the river, is similarly engaged (cf. Figs. 100 and 110).

The Lower Mississippi was explored by the Spaniards in the sixteenth century. French explorers from the St. Lawrence descended it in the seventeenth century, and named the lower basin Louisiana, in honour of Louis XIV. New Orleans was founded in 1718. Louisiana was transferred to Spain in 1763, restored to France in 1800, and purchased by the United States in 1803. It included most of the present United States between the Mississippi and the Rocky Mountains, with the exception of Texas and part of New Mexico, which then formed part of Mexico. The exploration of the new territory was at once taken in hand. The various Indian trails were followed and mapped, and the western tributaries of the Mississippi traced through very difficult country to their source. The Pacific was reached by way of the Jefferson tributary of the Mississippi and the Snake tributary of the Columbia in 1805. The construction of transcontinental railways followed.

The High Arid Western Plains. The upper half of the basin of the Southern Saskatchewan, the Upper Missouri east of the mountains, and almost all the land to the south between the Rockies and 100° W. consists of high plains which are too

dry for agriculture. The Southern Saskatchewan forms the Canadian district of Alberta, where stock-raising is the chief occupation. Similar conditions prevail in the east of Montana, Wyoming, Colorado, and Nevada, and in the west of the Dakotas, Nebraska, Oklahoma, and Texas. Most of this region is over 3,000 feet high. It is crossed by the Missouri, Yellowstone, Platte, and other tributaries of the Mississippi, flowing in wide incised valleys with high walls. Their broad floors may be filled in flood, but generally contain only narrow winding streams. The country is a rolling grassy prairie, well suited for stock, except in barren alkaline tracts such as the Bad Lands of Dakota in the north, or the high Staked Plains of Texas in the south.

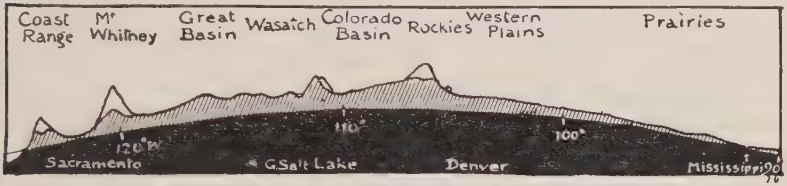


FIG. 106. Section across North America west of 90° W. on the parallel of 40° N. (Mt. Whitney is 14,500 feet high.)

This region forms a ranching country. Cattle are allowed to wander in great herds in a half-wild condition over large ranches or grazing grounds. They are periodically inspected, numbered, and branded by mounted herdsmen known as cowboys. The capitals of the ranching country are Kansas City, and Omaha, both on the Missouri, which rank next to Chicago as slaughtering and meat-packing centres. They are also great stock markets. Wheat is grown where irrigation is possible, especially round Calgary, in the Bow River valley.

The Western Mountain System. This is continuous from Bering Strait to the Isthmus of Tehuantepec. In the extreme north it runs east and west. It then bends round and follows a direction from north-north-west to south-south-

east. Its greatest breadth is not far short of 1,000 miles. Many parts are as yet imperfectly known, especially in the north.

As in the plains, there is a certain physical continuity between north and south, but there is a greater diversity in surface features. Other variations are due to difference in elevation. Almost everywhere three principal chains can be traced; (1) the Eastern or Rocky Mountains, rising steeply above the high plains at their eastern base; (2) the Western Chain, known under various names, and separated from the Rockies by high plateaus, which are specially well developed in the south-west of the United States; and (3) the Coastal Chain, partly on the mainland, partly on the bordering islands, and separated from the Western Chain by a deep and partly submerged trough.

The system can be divided into a number of basins, each of which broadly forms a natural physical and economic region. They are (1) the Yukon Plateaus, including the Alaskan Peninsula; (2) British Columbia, with the Skeena, Stikine, Fraser, and the northern part of the Columbia and the Willamette valleys, and the islands bordering the coast; (3) the Idaho plateau, or Snake basin; (4) the Great Basin of inland drainage, and its margin; (5) the Californian Valley, or Sacramento Basin; (6) the Colorado Plateau and Basin; and (7) the Mexican Plateau (see Figs. 107 to 110).

The Yukon Plateau. The feature-lines run from east to west, bending to the south-west in the Alaskan Peninsula, and to the south-east in the Upper Yukon. The Yukon, whose length exceeds 2,000 miles, flows across the middle of the region to the lower west, and enters the shallow Bering Sea. It is broken by many rapids in its upper course, but is navigable in its lower course from June to October. During the winter it forms a sledging route. The climate is extreme. The winters are long and severe, but the summers are warm enough for vegetables and the hardier cereals to be grown with fair success. Most of the region is forested. It would

hardly have attracted attention but for its rich goldfields, especially round the Klondike, a tributary of the Yukon. The chief centre is Dawson City, at the confluence of the Klondike and the Yukon, 1,500 miles from its mouth, and not far from the frontier of the United States (Alaska), which is formed by the meridian of 141° E.

Between the Yukon and the coast are the little-known Alaskan ranges, with Mount McKinley (20,500 feet), the highest mountain of the continent. The heavily-glaciated coastal range, with the volcanic Mount St. Elias (18,000 feet) and other lofty summits, is broken into islands in the west and east. From Dyea, in the east, at the head of the Lynn Canal, a railway crosses the White Pass (2,900 feet) to the Upper Yukon, known as the Lewis.

British Columbia. The coastal range is represented by the forested Queen Charlotte and Vancouver Islands. These fringe the fiord coast of the Northern Cascades, part of the Western Chain. East of the Cascades the plateau of British Columbia stretches east to the Gold Range, the westernmost of a series of parallel ranges (Gold, Cariboo, Selkirk, &c.), enclosing the Upper Fraser and Columbia, and giving these rivers a zig-zag course. The Rockies, or Eastern Chain, contain many lofty summits (Mount Columbia, over 13,000 feet) and great glaciers. The glaciated upper and forested lower slopes form very picturesque scenery.

The climate of British Columbia is rendered equable by the south-westerly winds from the Pacific. The rainfall is heavy on the Pacific slopes, but diminishes rapidly towards the interior, where the climate is also more extreme. Much of the surface is densely forested, the coastal forests containing Douglas pines and other gigantic conifers. Lumbering is an important occupation. The mineral wealth includes gold, but except where railways have been built it is as yet inaccessible. Rossland is the centre of a gold and silver-lead mining district. Coal is found round the Crow's Nest Pass, and Vancouver Island supplies most of the coal used along the Pacific coast.

The best agricultural land is in the south of the interior plateau. The narrow river valleys are also fertile.

The capital is Victoria, on Vancouver Island, near the naval port of Esquimalt, with a magnificent harbour and coaling

FIG. 107. British Columbia and adjacent lands. The land over 5,000 feet is shaded.

facilities. Vancouver, on the mainland, on Burrard Inlet, is the terminus of the Canadian Pacific Railway, which goes up the Fraser, crosses the Selkirks and other parallel ranges, and climbs the Rockies to the Kicking-Horse Pass (5,300 feet), and

descends the Bow River to Calgary, the centre of the rich ranching and agricultural district of Alberta.

The boundary with the United States (49° N.) is purely artificial. Puget Sound is continued in Willamette Valley, between the Coast and Cascade Ranges, across which the Columbia breaks to the sea. This fertile valley, which is about 200 miles long and thirty or forty miles wide, is a great

FIG. 108. The lower Fraser and Columbia valleys. The land over 2,000 feet is black. The Willamette river is the tributary entering the Columbia near its estuary.

wheat-growing region. Its outlet is Portland (Ore.), on the Columbia, a few miles below the confluence of the Willamette, with an enormous trade in wheat, fruit, lumber, and the product of the salmon fisheries of the Columbia, and with many industries based on these. Farther north Seattle, on Puget Sound, with similar occupations, is a port rapidly growing in

importance. Tacoma and Olympia are other outlets. Coal and iron are mined in the neighbourhood. Shipbuilding is developing.

The Idaho Plateau. The Northern Cascades of British Columbia are replaced to the south by the Southern Cascades, covered with volcanic rocks. In Idaho the plateau east of the Cascades, a continuation of that of British Columbia, is covered by a great lava-flow, which extends to the Rockies. It is drained by the Snake tributary of the Columbia, which flows in deep gorges, with the Shoshone and other fine falls as it descends. The climate is dry, and large tracts are covered with sage bush. In the more exposed, wetter districts, wheat cultivation is beginning. East of the Rockies, in Wyoming, is the Yellowstone National Park (5,500 square miles), with great lava-flows, extinct volcanoes, and many hot springs and geysers, all indications of comparatively recent volcanic activity. The deep canyon of the Yellowstone, a tributary of the Missouri, with gorgeously coloured rock walls from 600 to 1,500 feet high, is another of the wonders of the Park.

This region was explored after the Louisiana purchase. Previously it had been visited only by trappers from the east, who followed Indian trails in search of beaver and other furs. The Pacific coast of Oregon was visited by Drake, and the region north of the Columbia consequently formed the subject of disputes between Britain, which claimed it on that ground, and the United States, which claimed that it was discovered from the east by Boston fur-traders. In 1846 a compromise was arrived at and the parallel of 49° N. was agreed on as the boundary.

The Great Basin. The Great Basin of inland drainage is a little-known region of parallel ridges and flat plains, with depressions filled by salt lakes. The largest of these is the Great Salt Lake. The region is too dry for agriculture, except where it can be irrigated. Round Salt Lake City this has been done with great success. The Wasatch Mountains form

the eastern boundary between the Great Basin and the Colorado Plateau.

The Colorado Plateau is a dry region, where the rivers have cut deep canyons through all the sedimentary strata down to the underlying base of hard primitive rock. The high plateau includes the eastern part of New Mexico and Arizona, an arid, semi-desert region, falling in the west to the still more arid lower basin of the Colorado, which forms the Mohave Desert of California and the Gila Desert of Arizona. These are the trade-wind deserts of North America (see p. 10). Two depressions are below sea-level, the Death Valley, east of the Sierra Nevada, and the Salton Sink, near the mouth of the Colorado. In 1905 the Colorado burst into the latter depression, forming a lake, which is slowly growing in depth and area.

The Colorado Plateau is bordered to the east by the Rocky Mountains, which are rich in minerals, especially gold and copper. In Wyoming and Colorado the headwaters of the rivers flow through high intermont plains, known as parks, in which some stock-raising and agriculture are carried on. The towns are chiefly at the opening of the valleys, and many of them are on railway routes. Helena, on the Missouri, near its point of issue from the mountains, is on the southern route from Duluth to Seattle. Cheyenne is on the main line from the east to Salt Lake City and San Francisco. Denver, on the South Platte, the centre of the agricultural, stock-raising, and mining districts of Colorado and New Mexico and engaged in many industries depending on their products and needs, is an important railway centre though not on any great through route. Pueblo, on the Arkansas, with many metal industries, is on the main route from the Mississippi (Kansas City) to Salt Lake and San Francisco. Santa Fé, near the Rio Grande, a town dating from the Spanish conquest, is on the southern route between the same points. At El Paso, where the Rio Grande descends from the mountains to the Mexican Plateau, the Mexican and Californian lines diverge.

California. The valley between the Coastal Range and the Western Range, or Sierra Nevada, widens to the broad fertile valley of California. The Sierra Nevada slopes steeply towards the east, but more gently to the west. The rivers form lofty falls, of which those of the streams entering the deep Yosemite Valley, are a type. Their waters, fed by the abundant rain and snow of the Sierras, are used to irrigate the plains below.

FIG. 109. California. The land over 2,000 feet is black; that between 2,000 and 1,000 feet is shaded, the lower land is left white.

The Californian Valley is drained by the Sacramento from the north and the San Joaquin from the south, both entering the transverse gulf of San Francisco. The climate is that of the Mediterranean (note the lat. 35° to 41°), and all the Mediterranean fruits are grown. Wheat is largely grown in the north.

San Francisco, the capital of the Pacific coast, is built on a hilly peninsula between the Pacific and the Gulf of San

Francisco, which is entered by the Golden Gate. Though it now carries on many great industries and an enormous commerce, it dates only from the gold rush of 1848. It is the outlet for the whole of the fertile valley in which Sacramento in the middle of the valley, is the second centre. The southern port is Los Angeles.

California, which formed part of the Spanish empire of Mexico, was reached from the Pacific. In the eighteenth century the Franciscans established agricultural and commercial missions, but the country as a whole remained backward till the fall of the Spanish power in 1821. Exploration was then pushed east across the Sierra Nevada, and population began to enter by that route. During the Mexican War of 1846 the territory of Upper California passed to the United States, though California was not formally admitted till 1850. The discovery of gold in 1848 attracted pioneers from all parts, and indirectly promoted settlement. The rich gold mines are now worked by great mining companies, but wheat is a still more valuable and permanent source of wealth.

The Mexican Plateau. In Mexico the Gulf of California is a continuation of the submerged trough east of the Coastal Range (see p. 314) which is represented by the Californian Peninsula. The eastern and western chains rise above relatively narrow coastal plains, enclosing the Mexican plateau between them. This rises steeply southwards from the valleys of the Gila and Rio Grande del Norte, and is highest in the west. Intermittent streams flow to the Rio Grande, or to the east coast. South of the deep Santiago valley, which opens to the west, is a volcanic range extending from Colima in the west to Orizaba in the east, and including Popocatapetl and other lofty summits.

North America ends at the isthmus of Tehuantepec, but politically Mexico includes the low limestone peninsula of Yucatan, which produces sisal-hemp or henequen, and the north-west end of the Central American mountains.

The coastal plain and the lands below 3,000 feet form the *tierra caliente*, or hot zone. This is hot and moist in the south, drier in the north, and generally malarial. The forests produce mahogany and other timber. Above this zone, where cacao, sugar, rice, and cotton are grown, rise the cooler zones of coffee, maize, and tobacco, succeeded by the wheat and

FIG. 110. Mexico and Central America. The land over 500 feet is shaded, that over 3,000 feet is black.

pasture lands of the *tierra templada*, or temperate belt, with considerable extremes of temperature and drought. Above 7,000 feet is the *tierra fria*, or cool belt, with magnificent forests. The upper tree limit is 13,500 feet. The temperate zone is very fertile where irrigated, as at the northern base of the volcanic chain round Mexico City and Lake. The north and centre of Mexico are arid and semi-desert. The cactus is

everywhere abundant, assuming characteristic forms at varying elevations.

Mexico is rich in minerals. Silver, the most valuable, is widely distributed, especially in the north-west, between the Californian Gulf and the Middle Rio Grande del Norte, round Paral, and in the east central region in the San Juan basin, round Zacatecas, and Guanajuato. Copper, gold, and lead are also valuable. The chief manufactures are tobacco and distilling.

The Mexican Plateau is reached from the United States by several lines. One passes through the centre from El Paso by Chihuahua and Zacatecas, and another in the east by Saltilla, San Luis Potosi, and Guanajuato to Mexico City, the capital. From Mexico City lines run by Guadalajara to Manzanillo in the west and to Vera Cruz in the east. A line of great importance crosses the Isthmus of Tehuantepec from Coatzacoalcos on the Atlantic southwards to Salina Cruz on the Pacific.

Mexico was early invaded from Yucatan by the Spaniards, who overthrew the native Aztec civilization, and concentrated their energies on the mines. A fleet sailed annually from Acapulco to the Philippines, which were long politically attached to Mexico, under the name of New Spain. The Spanish power lasted three centuries, but was overthrown early in the nineteenth century. At present Mexico is a Federal Republic.

CENTRAL AMERICA.

Physical Features and Routes. The isthmus of Central America extends from the isthmus of Tehuantepec to that of Panama, running for about 1,200 miles in a direction WNW. to ESE. Its connexion with the continents which it unites was made in comparatively recent geological times, and structurally it is more closely related to the Antillean islands of Cuba and Jamaica.

Central America consists of (1) a lofty volcanic belt, with peaks reaching 14,000 feet, parallel to the Pacific coast, at no great distance from it, (2) of the limestone plateau of Yucatan, and (3) south of Yucatan and in Honduras and Nicaragua of ranges running from east to west, fringed in the east by malarial lowlands. The rivers to both oceans are short, and of little use for communication (see Fig. 110).

Central America, nowhere over 300 miles broad, has four important narrowings, where the barrier between the Atlantic and Pacific Oceans is reduced to a minimum. These largely determine the lines of communication between the two oceans. (1) The most northerly is the isthmus of Tehuantepec (politically in Mexico), about 125 miles broad and under 400 feet high at its lowest. It is crossed by a railway (see p. 323). East of Tehuantepec Central America widens rapidly, forming the Mexican states of Chiapas and Yucatan, the independent republic of Guatemala, and the colony of British Honduras. The second narrowing, (2) Honduras, is about 180 miles wide, and very mountainous. It is crossed by two lines, the Guatemalan line, running from Puerto Barrios on the Atlantic by Guatemala city (5,000 feet), to San José on the Pacific, and the Honduras line, from Puerto Cortes on the Atlantic to La Brea on the Pacific. Between the narrowings of (2) Honduras and (3) Nicaragua the barrier again broadens, forming the independent republics of Honduras, Salvador, and Nicaragua. At the Nicaraguan narrowing the barrier between the two oceans is still 150 miles wide, but the western half consists of a great depression, 100 feet above sea-level, occupied by Lakes Managua and Nicaragua, which are only about thirteen miles from the Pacific. Connexion with the Atlantic is given by the San Juan river, from the eastern end of Lake Nicaragua. This route has been surveyed with a view to constructing a ship-canal, 185 miles long, which would utilize the canalized San Juan river and Lake Nicaragua and have its Pacific terminus at Brito, about fourteen miles from the lake. An objection to this

route is the existence of active volcanoes on islands in the lake, which might threaten the safety of the canal. At present communication between the two oceans is by steamer on the San Juan river to Granada on Lake Nicaragua, the terminus of a line from Corinto, the Pacific port.

South of the Nicaraguan narrowing Central America does not again attain any considerable breadth, but its mountainous character makes communication between the two oceans difficult. A line is carried across the mountains of Costa Rica from Puerto Limon on the Atlantic, by San José, to Punta Arenas on the Pacific. The mountains of Costa Rica are continued by those of Panama, which narrow to (4) the isthmus of Panama, where the barrier is only thirty-five miles wide, and the low Culebra saddle (under 300 feet), between mountains 3,000 feet high, gives an easy route. The isthmus, from which the Pacific was first seen by Cortes, is crossed by a railway from Colon to Panama which utilizes the Culebra depression. A lock canal, to be controlled by the United States, is under construction. A cutting, 250 feet deep and seven miles long, will carry it across the mountains at Culebra. The opening of this canal will reduce by several thousand miles the sea route between the eastern and gulf ports of the United States and (1) San Francisco and other western ports of the United States, (2) the western ports of South America, and (3) the ports of China and Japan. Western Europe will have a shorter sea route to the two former and an alternative route to the last.

Climate and Vegetation. Central America lies chiefly in the trade-wind area, the eastern or windward shores receiving the heaviest rainfall. The south is near the equatorial belt, and has a much heavier rainfall, with a dry season from January to April. At Colon the annual rainfall exceeds 125 inches. The range of elevation gives a corresponding range of climate. The *tierra caliente*, *tierra templada*, and *tierra fria* correspond with those of Mexico. The eastern lowlands, fringed with malarial swamps and densely forested, are not so well suited

for cultivation and settlement as the valleys and mountain slopes of the drier west. The tree-line is about 13,500 feet, the height of the Bernese Alps. There are many high plateaus, which form pastoral savana lands. The forests of the *tierra caliente* produce mahogany and other valuable woods, rubber, and all tropical fruits. Cacao is the chief cultivated plant. The *tierra templada*, from 3,000 to 7,000 feet, is forested in the east, and a savana region in the west. Coffee is the chief cultivated plant. The *tierra fria*, over 7,000 feet, produces grain.

Civilization. The old civilizations of Guatemala and Yucatan were destroyed by the Spanish conquest, which became effective early in the sixteenth century. The two races intermingled freely, and Spanish half-breeds now form the bulk of the population. The Spanish yoke was thrown off in the first quarter of last century, but there has been little political stability. The difficulties of communication favour a divided political control, and impede the spread of education. The chief occupation is agriculture.

THE WEST INDIES.

Physical Structure. The West Indies form the eastern border of the Caribbean Sea. The large islands of the Great Antilles, Cuba, Jamaica, Hispaniola, and Porto Rico stretch east from Yucatan, while the Bahamas and the Lesser Antilles run from the south of Florida to the delta of the Orinoco.

The Great Antilles are mountainous islands elongated from east to west. In Hispaniola three ranges, north, central, and southern, are well defined, the highest point exceeding 10,000 feet. In Porto Rico these unite to form one mountainous mass, which runs from east to west, and nowhere reaches 4,000 feet. In Jamaica the southern range of Hispaniola is continued westwards by the Blue Mountains (7,000 feet), which are separated by a valley from the lower western limestone plateau,

with sink-holes and other karst characteristics. In Cuba the central range of Hispaniola is represented by the Sierra Maestra (8,000 feet), while the western part is a highland known as the Sierra de los Organos (2,500 feet). Between the two is a lower limestone karst region. The trocha, famous in the history of Cuba, is a low, marshy depression, between forty and fifty miles wide, crossing the island from north to south. The lines of elevation can be traced through submarine ridges from Jamaica to Honduras, from the Sierra

FIG. 111. The West Indies and Central America.

Maestra by the island of Grand Cayman to British Honduras, and from the Organos Mountains to Yucatan.

The Lesser Antilles are elongated from north to south, and stretch in the same direction from Porto Rico to Trinidad, a fragment detached from the mainland of South America. The western islands are volcanic. Mont Pelé, in Martinique, and the Souffrière, in St. Vincent, caused disastrous eruptions in 1902, the former wiping out the town of St. Pierre. The eastern islands from the Bahamas to Barbados are limestone.

Climate. With the exception of the Bahamas, the West Indies are entirely within the tropics. All have a typically tropical climate, modified by their insular position. The seasons are distinguished less by difference in temperature than by difference of rainfall, the distinction between the dry, or winter, season and the wet, or summer, season being well marked. Except for violent hurricanes towards the end of the rainy season storms are rare. These hurricanes do not occur within 10° of the equator, so that the southern islands escape them.

The mean winter temperature of the West Indies is between 70° and 80° F. The summer temperature is over 80°. The varying elevation gives a corresponding variety of climate in the mountainous islands. The West Indies lie in the track of the north-east trades, and receive a heavy rainfall on their windward slopes, amounting in places to 100 inches. The interior and the leeward slopes are much drier.

Vegetation and Occupations. The mountainous islands show almost every type of vegetation, from the hot wet forests of the windward slopes to the savanas of the higher drier interior. The richness of the tropical forest is well seen in Cuba and Hispaniola, which produce mahogany, cedar, ebony, and other ornamental woods, fustic, logwood, and other dyewoods, and every kind of tropical fruit. The royal palm of Cuba is said to furnish the negro with all he needs both for food and utensils. The cultivation of sugar, once the chief agricultural interest, has greatly declined. Tropical fruits, especially the banana, coffee, cacao, and tobacco are cultivated in varying degrees in the different islands.

History. Columbus reached the Bahamas in 1492, and the whole archipelago was soon discovered and claimed by Spain. The name West Indies perpetuates the belief of Columbus that he had found a western route to India. Contrary to the expectations of the conquerors, no precious metals were found. These were abundant on the adjacent mainland of the Caribbean Sea, whence a plate fleet sailed

annually to Spain. The West Indies, which command the routes to Europe, consequently became the resort of the buccaneers who endeavoured to intercept it. The agricultural resources of the West Indies proved very valuable, large sugar estates being cultivated by negro labour. As the Spanish power declined other nations gained a footing, but many of the islands frequently changed hands.

A century ago the West Indies were regarded as our most valuable colonies, but the nineteenth century saw the gradual decay of their prosperity. The emancipation of the slaves made labour scarce, dear, and unreliable, while the growth of the European beet-sugar industry reduced the price of sugar. This industry dates from the Napoleonic wars, when British goods were refused entrance to the continent. Careful attention to the best methods of cultivation and manufacture and a system of bounties enabled it to compete successfully with the sugar of the West Indies, where little attention was paid to economies of cultivation, preparation, or transport. Cuba, which adopted a more progressive policy, remained prosperous until the beginning of the long struggle with Spain which ended in 1898. Prosperity is slowly reviving with improved methods and the introduction of other staples.

Politically, Cuba and Hispaniola are independent. The latter island is divided into two states, the Spanish-speaking negro republic of Santo Domingo in the east, and the French-speaking negro republic of Haiti in the west. Porto Rico belongs to the United States. Jamaica and most of the smaller islands are British. Guadeloupe and Martinique are French, St. Eustace, Saba, Curaçao, and some other small islands are Dutch, and some of the Virgin Islands are Danish.

Cuba. The tropical forests of Cuba have already been mentioned. Tobacco of fine quality is grown on the Organos Mountains and sugar in the central part of the island. Iron ore is abundant in the Sierra Maestra. The capital is Havana, immediately south of Florida, commanding the routes through the straits of Florida and Yucatan. The second city is

Santiago de Cuba, on a magnificent harbour on the south coast, commanding the route by the Windward Passage, but separated from the interior by the lofty forested Sierra Maestra.

Hispaniola has done little to develop its great forest and agricultural resources in recent years. Coffee is the chief cultivated product. The western part, now Haiti, passed to France in the latter half of the seventeenth century and became prosperous. At the end of the eighteenth century the slaves rose against the planters, and after a long struggle regained their independence. Santo Domingo became a republic in 1844. The capital of Haiti is Port au Prince. San Domingo, founded in 1496, the capital of Santo Domingo, is one of the original Spanish settlements in the New World.

Porto Rico has been largely cleared of its forests for the cultivation of sugar. It passed from Spain to the United States in 1898. The capital is San Juan.

Jamaica was discovered in 1494, and became British in 1655. Coffee is cultivated on the Blue Mountains. Bananas are grown for the American and British markets. Sugar, cacao, tobacco, and various spices are also cultivated. The capital is Kingston, at the base of the Blue Mountains on a lagoon almost enclosed by a long sandspit, at the extremity of which, commanding the entrance, was Port Royal, famous in West Indian history. Kingston suffered severely from an earthquake in 1907. A line from Kingston to Port Antonio crosses the valley between the Blue Mountains and the western plateau, over which the line is continued to Montego.

The Bahamas are low coral or limestone islands, producing sisal-hemp and pineapples. The capital is Nassau, on New Providence.

The Lesser Antilles, nearly all British, are officially divided into the Leeward Islands in the north, and the Windward Islands in the south, the former name being quite inappropriate. Both consist of a double chain, volcanic in the

west and limestone in the east. Of the westerly volcanic Leeward Islands the Virgin Islands, St. Kitts, Montserrat, and Dominica, and in the eastern limestone islands Barbuda and Antigua, are the most important. The two formations converge in Guadeloupe (French), north of Dominica, which is volcanic in the west and limestone in the east. In the Windward Islands Martinique (French), Santa Lucia, St. Vincent, and Grenada are the largest of the volcanic western chain. Barbados, further east, is limestone. The volcanic islands are beautiful and fertile, but the limestone islands are healthier and exposed to fewer risks. Sugar is grown in Barbados by peasant proprietors with considerable success.

The South American Islands. Of these Tobago and Trinidad are British. Trinidad is bordered north and south by mountain chains, which project as peninsulas and enclose the Gulf of Paria. On this gulf is the chief town, Port of Spain, with a line running to the sugar and cacao plantations of the interior. Near Brea, on the west coast, is the small but famous pitch lake.

SOUTH AMERICA.

Natural Regions of South America. South America, like Africa, is chiefly in the hot zone, only a small proportion of the continent lying outside the area of hot summers.

Three configuration areas are well marked, (1) the lofty mountain belt of the west, with summits exceeding 20,000 feet, and with many high valleys and plateaus from 6,000 to 12,000 feet above the sea; (2) the eastern highlands, exceeding 6,000 feet and averaging from 2,000 to 3,000 feet high; and (3) the lowlands, rising to 600 or 1,000 feet. In this triple configuration there is an obvious resemblance to that of North America, though the continuity of the two continents is interrupted by the Caribbean region.

The lowlands form four natural regions: (1) the densely forested Amazon lowlands, hot and wet at all seasons; (2) the

Orinoco lowlands, with summer rains and a rich savana vegetation; (3) the Plate lowlands, also savanas, with hot wet summers and cooler dry winters; and (4) the Patagonian lowlands, with warm summers, cool winters, and little rain, forming a steppe region.

The natural regions of the Eastern Highlands are (1) the Guiana Highlands and (2) the Brazilian Highlands, both of the Sudan type, with savana and open woods, and (3) what may be termed the Plate Highlands, south of the tropic, with cooler winters and rain at all seasons, but most in summer. These may be compared with eastern New South Wales, southern Queensland, China, and the eastern United States.

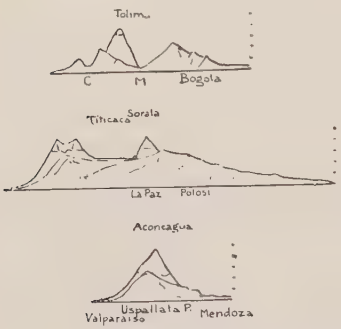


FIG. 112. Three sections across the Andes. The distance between the dots = 1,000 meters or 3,300 feet. C = Cauca, M = Magdalena.

The Western Mountains, or Andes, extend for 4,500 miles parallel to the Pacific coast. In the centre, where they are broadest, they are between 400 and 500 miles wide. In the south they are reduced to a single chain, but in the north two, three, or four chains exist. Linked with the Andes by higher ground are the Venezuelan chains which border the southern margin of the Caribbean Sea.

The western mountain area may be divided into five natural regions, (1) the Colombian or north-western region, (2) the central or Bolivian region, (3) the western coastal desert region, (4) the valley and mountains of Central Chile, Mediterranean in type, and (5) the mountains and islands of Southern Chile, of the North-west European type.

The Colombian Region. This is wider than the present political division of Colombia. It includes Ecuador and the mountainous western part of Venezuela, which lies outside the

Andes proper. The whole of the Colombian region, with an elevation varying from sea-level to 20,000 feet above it, may be compared with Central America. Both exhibit the same succession of climate and vegetation zones, with approximately the same cultivated plants in each. The high intermont plateaus are either cultivated or form savana lands where cattle are bred.

Venezuela. Three mountain ranges can be traced in Venezuela. The two ranges which form the northern and southern margins of Trinidad are continued by the north and south ranges of Venezuela, while the third, which is partly submerged, is represented by Tobago, Margarita, and other islands off the north coast.

The important centres are in the fertile intermont plains. Coffee and cacao are the chief cultivated plants. Sugar, cotton, tobacco, indigo, cinchona, and sarsaparilla are also grown. The capital, Caracas (4,000 feet), is separated by the Silla de Caracas (9,000 feet) from its port, La Guaira, one of the hottest places in the world. The two towns, which are six miles apart, are connected by a line twenty-three miles long, an instance of the difficulties of communication in this part of Venezuela. Other important towns are Merida (5,000 feet), in the Sierra de Merida (15,400 feet), and Valencia.

The continuity of the northern range of Venezuela is interrupted by the gulf and lagoon of Maracaibo. These are separated by a bar where the town of Maracaibo is built. West of the lagoon the northern range is continued by the Sierra Nevada de Santa Marta. The Maracaibo lagoon penetrates far inland and forms the outlet for the Merida region.

Colombia. Colombia is traversed from north to south by a coastal range and three main chains of the Andes, containing many extinct volcanoes. These chains converge at the knot of Pasto. The long valleys between the cordilleras or chains are drained north to the Caribbean Sea by the Magdalena, Cauca, and Atrato, flowing through marshy lowlands, but forming the chief routes from the sea to the interior. The

mineral wealth, which furnished much of the treasure of the Spanish plate fleet, includes gold, silver, and fine emeralds. Cultivation is possible up to nearly 10,000 feet. The region

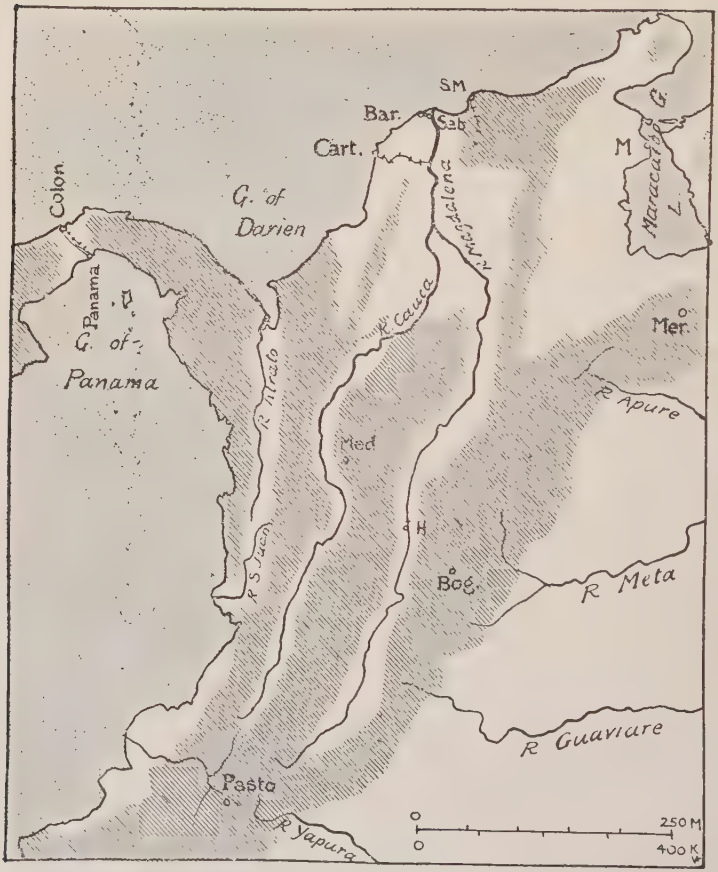


FIG. 113. NW. South America, showing the Colombian Andes and the Isthmus of Panama. The higher land is shaded.

above the tree-line (10,000 -12,000 feet), the *paramos*, is bleak and uninhabited. The towns are either on the high intermont plains of the interior or on the coast. Bogota, the

capital (8,500 feet), was founded by the Spanish conquerors in 1538, in a high plain, which contains valuable salt-mines and some coal. Medellin (4,800 feet), in the central range, is the centre of a gold-mining region. Cartagena, the Caribbean port, from which the Spanish galleons sailed, is now displaced by Barranquilla and Santa Marta. The Pacific ports are less important.

Ecuador. In Ecuador the Andes form two roughly parallel chains, both volcanic. Between the ranges are lofty plains, where excellent wheat is grown. Cacao, coffee, sugar, &c., are cultivated at lower elevations. Quito, the capital, stands almost on the latitude of the equator, in a fertile plain (9,000 feet) producing cotton, maize, and wheat. It is overlooked by the volcanoes of Chimborazo (21,500 feet) in the western range, and Cotopaxi and Antisana, both over 19,000 feet, in the eastern. The port is Guayaquil, on the gulf of Guayaquil, at the end of a fertile valley between the coastal range and the western main chain.

Venezuela, Colombia, and Ecuador sink on the east through dense forests, the *montana* region, to the plains of the Amazon and Orinoco. The montana region produces cacao, rubber cinchona, &c. The development of this rich region is hampered by the lack of the means of communication.

The High Plateaus of Peru and Bolivia. In Southern Ecuador the Andes become lower and narrower. The gulf of Guayaquil cuts through the coastal range to the base of the main chain almost in the line along which the Amazon basin reaches farthest west. South of the gulf three complicated parallel chains form the west, central, and eastern cordilleras of Peru, approaching each other at the Cerro de Pasco, near the town and silver mines of that name. Here are the sources of the Marañon, the main stream of the Amazon, and its affluent the Huallaga. The Marañon flows north between the west and central cordilleras and breaks through the eastern chain to the eastern plains by a series of falls and rapids terminating at the Pongo or Narrows of Manserriche,

below which it is navigable. The historic Spanish route across the Andes to the Amazon was from Pacasmayo, on the coast, to Cajamarca (ninety miles by rail on the eastern slope of the central cordillera), the ruins of which attest its

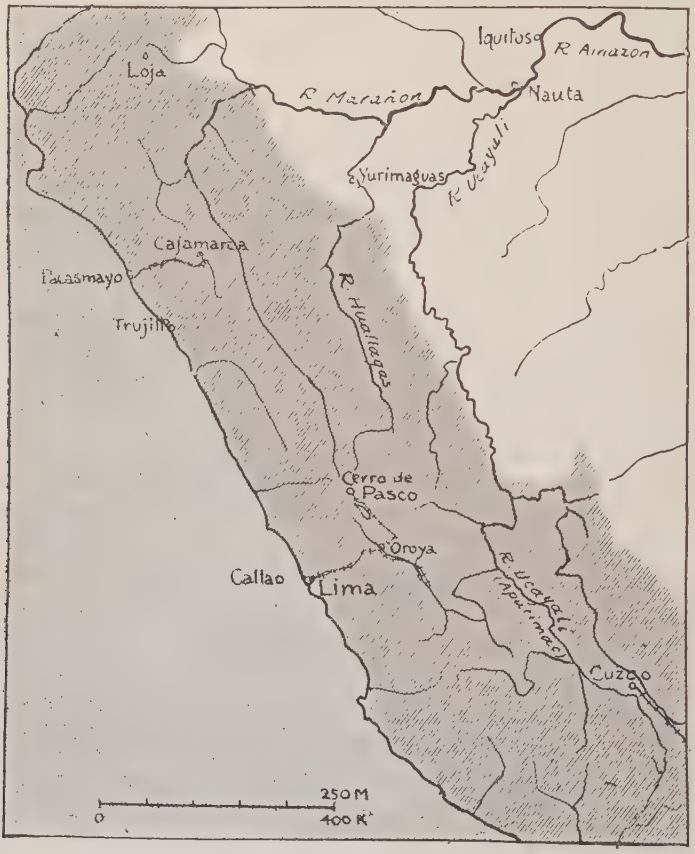


FIG. 114. Peruvian Andes and upper waters of the Amazon. The higher land is shaded. For the rest of the Amazon basin see Figs. 113, 115 and 117.

importance in the days of the Incas. Thence the trail went to Yurimaguas, the head of the Huallaga navigation (Fig. 114).

South of the Cerro de Pasco the valleys, here less continuous, are divided by transverse spurs from the main chains

into high intermont plains, of which Oroya (12,000 feet) and Cuzco (11,400 feet) are the most important. Both are drained to the Ucayali, the longest feeder of the Amazon, which flows between the central and eastern chains, breaking through the latter to its confluence with the Marañon, below which the river is known as the Amazon. Cuzco was the capital of the Inca power which preceded the Spanish conquest. It has colossal Inca monuments and the remains of an ancient route to the coast at Lima, 350 miles distant.

Oroya (12,000 feet), reached by a railway from Lima, is the starting-point of a road to the head of navigation on the Pichis tributary of the Ucayali. This is the route proposed for a railway to the rubber districts of the upper Amazon, of which Iquitos is the centre. The route across the Andes to the upper Amazon is so difficult that the journey is generally made from Callao to Panama (1,570 miles), thence to New York (2,030 miles), by sea to Para (3,000 miles), and up the Amazon to Iquitos (2,300 miles), a détour of over 7,000 miles.

The largest plain in the Andes is the plateau of Bolivia (12,000–13,000 feet), which is 500 miles long and over 100 miles broad at its broadest. It is enclosed between the western cordillera, and the higher eastern or Cordillera Real, with the peaks of Sorata (21,500 feet) and Illimani (21,200 feet). The daily range of temperature is very great. Midday is very hot, but the nights are cold or even frosty. The portions of the plateau capable of cultivation are called *punas*, the higher, bleaker parts *paramos*. Outside the plateau area cereals are cultivated in the *tierra fria* (9,000–11,000 feet). In the zone below, down to 5,000 feet, are the great cinchona forests of the eastern slopes of the Andes. Below 5,000 feet the vegetation is tropical.

The Bolivian plateau forms a basin of inland drainage. In the northern half is Lake Titicaca, the largest lake of the continent (12,500 feet; 3,200 square miles), drained south to Lake Aullagas, or Poopo, which has no outlet. The chief

town of the Titicaca region, and of Bolivia, is La Paz (12,000 feet). Oruro (12,250 feet), with rich silver mines, is the centre of the Aullagas region. The rich silver mines of Potosi (13,300 feet) have been worked since the Spanish conquest.

South of Lake Aullagas the plateau is more broken. The

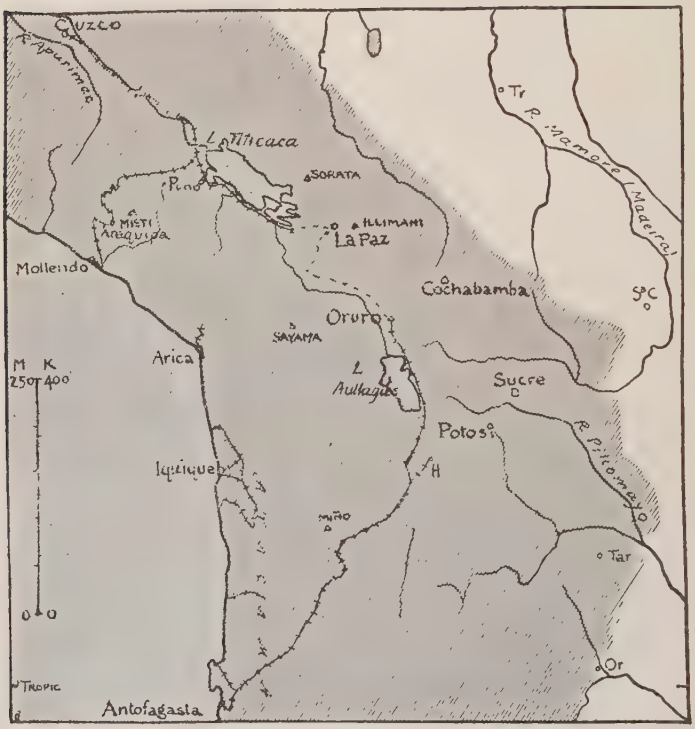


FIG. 115. The Bolivian Andes. The higher land is shaded.

western chain continues south, but the eastern breaks up into parallel ranges enclosing intermont plains. Cochabamba and Sucre are centres on the trade routes to the Amazon.

Peru and Bolivia, like the states of the Northern Andes, sink in the east through the *montana* or forest region, to the

plains of the Amazon. Rubber and cinchona, both very abundant, are sent east by the Amazon, but railways to the Pacific are spoken of.

The Coastal Desert. South of the gulf of Guayaquil the narrow coastal strip at the western base of the Andes is cooled by a cold current, which chills the winds passing over it. Rain is rare on the lowlands, but fogs and heavy dews occur. Snow and rain fall on the high Andes, feeding many short rivers which cross the coastal plain in parallel valleys, supplying water for irrigation. The Rimac, which falls 17,000 feet in its course of 80 miles to the sea at Callao, irrigates the region round Lima, and supplies power for the line connecting it with Callao, its port.

South of Arica the direction of the coast changes from south-east to south, and it becomes more arid. Vegetation disappears, except where irrigation is possible. The salts in the soil, never being washed out by rain, accumulate in vast deposits, forming the nitrate desert of Atacama. The nitrate desert zone is about 450 miles, the deposits occurring at a distance of from 15 to 90 miles from the coast, and at a height of from 3,500 to 13,000 feet above the sea. The chief nitrate ports are Iquique in the north and Copiapo in the south of this desert, but many smaller ports are used.

Three railways climb from the Pacific coast to the high Andes. In the north a line (136 miles) runs from Callao by Lima to Oroya (12,000 feet), tunnelling through the Andes at a height of 15,600 feet, the height of Mont Blanc. This is now carried to the silver mines of Cerro de Pasco. Another runs from Mollendo by Arequipa (7,640 feet) at the base of the volcano El Misti (19,200 feet) and crosses the western chain at a height of 14,500 feet to Puno on Lake Titicaca (12,500 feet). Another line runs from Antofagasta, in Chile, round the east of Lake Aullagas, to Oruro (12,250 feet), tapping the gold, silver, and copper mining districts.

Historical Summary. The high plateaus of the Andes were the seat of the ancient Inca civilization which was

flourishing at the time of the Spanish discovery. Its capital was at Cuzco, where imposing ruins still remain. The Inca civilization was largely based on skilful irrigation. Remains of former irrigation works, aqueducts, &c., still remain at Cuzco and elsewhere. The Inca Empire was overthrown by Pizarro (1531–1533), and the vice-royalty of Peru, which included Ecuador, Peru, Bolivia, and Argentina, was established on its ruins. The abundance of gold and silver which originally attracted the Spanish conquerors led to the decline of agriculture under Spanish rule. The Spanish yoke was thrown off in the first quarter of last century, Callao, the last Spanish possession on the mainland, being lost in 1826. Hostilities and boundary disputes between the various republics formed after the liberation have frequently occurred. By the war of 1879–81 Bolivia lost her seaboard, but has a right of access to the sea across Peruvian and Chilean territory.

Central Chile. South of 30° S. the eastern cordillera diminishes in height and breaks up into isolated ranges. The western cordillera runs southwards as a continuous range, culminating in Aconcagua (23,000 feet) and containing many summits hardly lower. From Guayaquil southwards this western chain has been remarkable for its continuity, height, and the loftiness of its passes, few of which are lower than the summit of the Alps. South of Aconcagua is the lower and very important Cumbre or Uspallata Pass (12,800 feet), leading from Chile to the Plate lands, and now being tunnelled to carry the transcontinental line from Buenos Aires to Valparaiso.

West of the western chain the coast is bordered by a coastal range. Between the two is the Central Valley of Chile, nearly 600 miles long, and averaging about 30 miles in breadth. This valley is the most fertile and populous part of Chile. The climate is of the Mediterranean type, with dry summers. Under irrigation all Mediterranean products can be grown, but the vine and orange are the most important.

Wheat and barley are exported. Maize and linseed are also grown. Lucerne or alfafa is grown for fodder.

La Serena is the port for the northern end of the valley. The dangerous harbour of Valparaiso, the most important Pacific port after San Francisco, is connected by rail across the coastal range with the capital Santiago, in the centre of the valley. La Concepcion and Valdivia are the ports of the southern half of the valley. From Concepcion southwards brown coal is abundant, but the chief mineral wealth of Chile, after the nitrates of the Atacama desert, consists of copper, which is widely distributed and exported in great quantities.

Southern Chile. From the latitude of Valdivia southwards the Andes show many traces of glaciation. Long narrow valley lakes are found on the eastern slopes of the Andes and also on the western slopes in the north. The snow-line, which in the Central Andes is as high as 17,000 or 18,000 feet, rapidly descends. South of 42° S. the coastal range is partly submerged and is represented by a long chain of islands, the largest of which is Chiloe. The sounds between these islands and the mainland continue the Central Valley of Chile. The glaciated valleys of the main range become fiords in the southern area of submergence.

Lying in the track of the prevailing westerlies the climate is wet and stormy, and the whole region may be compared with the coast of Southern New Zealand, British Columbia, western Scotland, and Norway. The mountain slopes, now only a few thousand feet high, are densely forested. As timber is scarce elsewhere on the Pacific coast of South America, these forests are a valuable asset. The occupations are sheep and cattle breeding, with fishing along the coasts.

Magellan Strait is a fiord which has pierced the range, cutting off the desolate island of Tierra del Fuego, and giving direct communication by an intricate series of winding channels between the Atlantic and the Pacific. Punta Arenas, on

the mainland, is a coaling-station and the most southern town in the world. The climate of Tierra del Fuego is cold and wet. The forests are thin and stunted. Only the hardier cereals ripen. The chief occupations are sheep-rearing and gold-washing. The native Fuegians number only a few hundreds.

The Falkland Islands. The Falkland Islands, consisting of two large and about 200 smaller islands, lie 250 miles north-east of Tierra del Fuego. They are treeless, probably owing to the severe gales, but afford good sheep pasture. Port Stanley, on the east island, is a port of call where ships can repair after the storms of Cape Horn or the Roaring Forties.

The Patagonian Plateau. East of the Southern Andes the lands sink through the plateaus and plains of Patagonia to the Atlantic. Many of the mountain valleys contain picturesque long narrow lakes, formed by morainic dams. The watershed lies, as a rule, east of the Andes, a circumstance explained by the fact that the western rivers, with a steep slope and a heavy rainfall, have eaten back their valleys and tapped those of the eastern slope.

Near the base of the Andes the plateau is a steppe, well adapted for grazing, or possibly for agriculture with the aid of irrigation. The foehn or chinook wind (see p. 67) descends from the Andes, rendering the climate dry and warm for the latitude. Lying in the lee of the Andes, the whole region has a scanty rainfall, and much of it is a shingle desert. Sheep-rearing is the chief occupation in the steppes, and mining is beginning to develop in the south, where gold is found. A thin population of nomadic Indians lives by hunting and fishing.

The Pampas. North of 40° S. the dryness still continues, but the climate is warmer. In the south the Colorado and Limay rivers reach the sea, though parts of the upper Colorado basin are a salt desert with giant cactus vegetation. In the centre and north the rivers disappear in the

plains. Agricultural settlement is confined to the base of the Andes, where irrigation is possible and the vine and other Mediterranean products can be grown. Mendoza, in the south, lies at the eastern base of the Andes on the Uspallata route from Buenos Aires to Valparaiso, the railway between which is completed with the exception of the Uspallata tunnel. Tucuman and Salto lie farther north in intermont

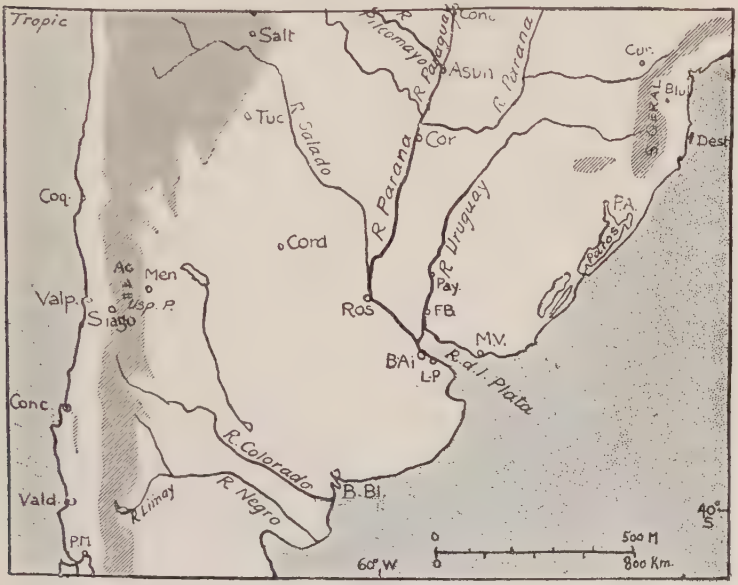


FIG. 116. The Southern Part of South America. The higher land is shaded.

valleys enclosed by eastern outliers of the Andes. Outside the irrigated areas the Pampas are vast rolling grassy plains, broken by the Sierra Cordoba (7,700 feet) in the centre, an outlier of the Andes. At the eastern base is Cordoba, on the margin of the great stock-raising Pampas, the cattle from which are sent east to the meat cities of the Plate. In the north the savana passes into the open woods of the Gran Chaco, a little-known forested region.

The Plate Highlands and Lowlands. The region east of the Pampas receives rain at all seasons, but chiefly in summer. It consists of the Plate lowlands west and south, and of the Plate highlands north of the Plate estuary. The latter pass gradually into the highlands of Southern Brazil.

The main lines of drainage are from north to south. The Parana rises in the Brazilian highlands and flows roughly parallel to the Atlantic coast to its confluence with the Paraguay, which has flowed almost due south from its source in the low heights south of the Amazon basin, receiving on its right bank the Pilcomayo, a long tributary from the Andes. The Parana, the united river, retains the direction of the Paraguay, and enters the long shallow estuary called the Plate river, or Rio de la Plata. To this estuary also flows the Uruguay from the southern Plate highlands.

The Plate Lowlands are agricultural, producing rich harvests of maize and wheat. The level character of the country has facilitated the growth of railways. These radiate from Buenos Aires, which is the federal capital and the great outlet for both the pastoral and agricultural districts of Argentina. Rosario is a growing city on the Parana, at the head of ocean navigation. It exports wheat. La Plata, a few miles from Buenos Aires, is a rival port. Bahia Blanca is the southern outlet of the agricultural region.

The lowlands north of the Pilcomayo form **Paraguay.** In the southern part, which is low and swampy, rice is cultivated. A valuable product is the yerba maté, or Paraguay tea, which is used throughout South America. Other agricultural products are sugar, cotton, maize, and tobacco. Parts of the Gran Chaco form dense forests, whose valuable products are yet little utilized. On the grass lands cattle are raised, which are slaughtered chiefly for their tallow, hides, bones, and horns. The capital is Ascuncion, on the Paraguay.

The Southern Plate Highlands form Uruguay, which may be compared with New South Wales in the same lati-

tudes. It is mainly a pastoral region, though the agricultural and mining resources are beginning to be developed. Meat packing and the making of meat extracts are important at Paysandu, Fray Bentos, and Montevideo. The latter, on the Plate estuary, is the capital and chief port.

The Northern Plate Highlands form part of Southern Brazil. They are in the latitude of Southern Queensland, with which they may be compared. They are more rugged than the Southern Highlands, and are highest in the east, where they form the Serra Geral. Numerous tributaries flow west and south to the Uruguay and Parana, and shorter rivers to the coast, which is fringed with lagoons. The largest of these is the Patos lagoon, with Porte Alegre at the northern and Rio Grande at the southern end.

The Northern Plate Highlands are a region of savanas and open woods, chiefly engaged in cattle-raising. A number of German agricultural settlements have been formed, e.g. at Blumenau and Curityba, and represent a highly progressive element.

The Brazilian Highlands. The Brazilian highlands are a tableland of the same type as the tablelands of the Old World (see p. 220), dissected by many long narrow rivers. The higher parts consist of savanas and open woods, known as *cataangas* and *campos*. The lower slopes and valleys are gradually being brought under cultivation, forming the coffee district of Brazil, one of the chief sources of the world's supply.

The tableland is highest near the coast, with many ranges and valleys running parallel to it in the south, recalling those of the south of Cape Colony. The coastal range, the Sierra de Mar, is pierced by the magnificent mountain-girt harbour of Rio de Janeiro, one of the finest in the world. Rio de Janeiro, founded in 1567, is the federal capital and the great rival of Buenos Aires.

Railways to the tableland are carried from Santos, the chief coffee port, to São Paolo, on a tributary of the Parana, founded

in the sixteenth century. São Paolo is the centre of the coffee district and of a growing agricultural, mining, and industrial region, in which the German element is increasing. From São Paolo the line runs parallel to the coast to Campos, near the coast, in the centre of a sugar district. Behind the valley followed by this line rises the Sierra de Mantiqueira, which is climbed by railways to Campinos, in a sugar district, Ouro

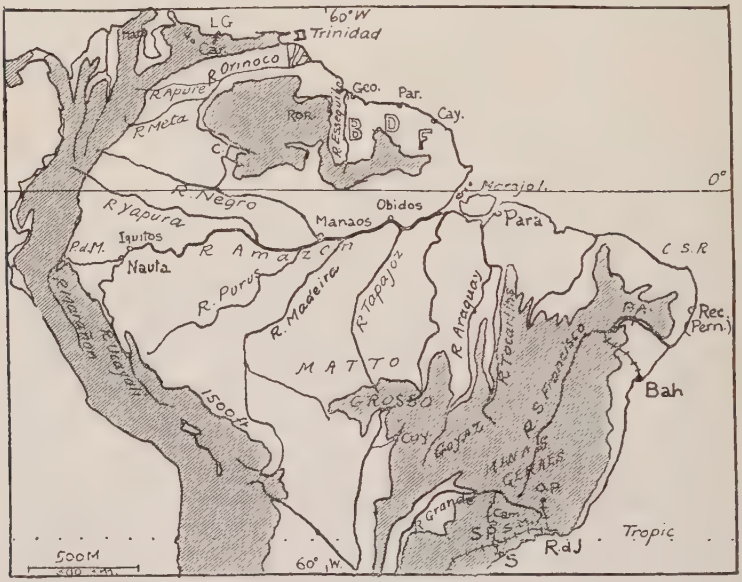


FIG. 117. The Amazon Basin and Eastern Highlands. The higher land is shaded.

Preto, and other centres of the forested mountain state of Minas Geraes. This is the most populous state in Brazil, and possesses gold and other mining resources. Much stock is raised on the savanas.

The chief river between the Plate and the Amazon is the São Francisco, navigable for 900 miles above the magnificent falls by which it descends from the tableland to the coast. These are now avoided by a railway. Its basin is for the

most part a forest or savana land, with some coffee and cotton plantations in the river valleys and near the coast. Of the many ports connected by rail with the interior, the most important is Bahia (San Salvador), with one of the finest harbours in the New World. It was founded a few years after the discovery of the continent, and is the ecclesiastical capital. North of the mouth of the São Francisco is the port of Recife (Pernambuco), with railways running to important coffee and cotton districts.

The western tablelands of Goyaz and Matto Grosso are drained north by the Tocantins-Araguay system and by tributaries of the Amazon, and south by tributaries of the Paraguay-Parana. This forms a savana region, passing into tropical forests in the valleys and on the Amazon margin. Cattle are bred in the savanas, but the whole region is thinly populated and little exploited. Cuyaba, on the Upper Paraguay, is the chief centre.

The Amazon. The Amazon, the longest river of the continent and perhaps of the world, rises some 150 miles from the Pacific, but it is so shut off from that ocean by the triple wall of the Andes that its waters are carried eastwards to the Atlantic. This ocean the Amazon reaches nearly 3 000 miles below the point at which it breaks eastwards through the Andes.

The main streams of the Amazon are the Marañon (p. 335) and the Ucayali (p. 337). The Ucayali is the longer, but the Marañon carries more water, and Lake Lauricocha, near the Cerro de Pasco, in which it rises, is usually considered the source of the Amazon. From the Pongo de Manserriche (p. 335) the main stream flows almost due east, approaching nearer the equator towards its mouth.

The Amazon basin is the largest river basin in the world. It is more than half the size of Europe without including the basin of the Tocantins, which enters its estuary. Of this a very large proportion is densely forested lowland. Owing to the flatness of its bed and the volume of water carried the

main stream is in many parts an intricate network of parallel rivers (*igarapes*), separated by forested islands. So vast is the Amazon lowland that the Purus tributary, which has its entire course within it, is 1,850 miles long. The Madeira, from the Bolivian Andes, is the longest tributary, joining the main stream a little below the confluence of the Rio Negro, the most important north bank affluent.

The divide between the tributaries of the upper Madeira and those of the Paraguay is very indefinite, consisting of low heights formed by the waste brought down by the upper Madeira (Rio Grande), which formerly flowed to the south. The divide between the Amazon and the Orinoco is even more indefinite, for the Cassiquiare, a sub-tributary of the Negro, actually branches off from the main stream of the Orinoco. This is probably an example of river capture in an incomplete stage (see *Oxford World Geography*). Below the confluence of the Madeira the Tapajoz, from the Matto Grosso tableland, enters the main stream. All these tributaries form falls at the margin of the older, harder, higher rocks over which they flow to the Amazon lowlands. Above these falls they are generally navigable for long stretches.

The circular shape of the Amazon basin and this fall line may be compared with those of the Congo, remembering the flat floor of the Amazon is almost at sea-level, while that of the Congo is over 1,000 feet above it. In the lower part of its course the Amazon basin narrows between the outliers of the Brazilian and Guiana highlands, suggesting a comparison with the narrowing of the Congo in its lower course. The Amazon enters the Atlantic by a great estuary with numerous islands at its mouth, of which the largest is Marajo. The Para channel to the south of this island is used by ships, as the bore formed by the heaping up of the tides in the main estuary renders it dangerous. Into the Para channel the Tocantins empties itself.

The Amazon drains one of the rainiest regions in the world. Much of its basin lies in the region which has rain at all

seasons, with short breaks at the solstices. The southern tributaries are flooded in the southern summer, the northern tributaries in the northern summer, so that the mean level of the main stream is fairly constant. The Amazon carries to the ocean a greater volume of water than any other river, and the freshening effect is felt over 200 miles out at sea. Owing to the flatness of the Amazon valley the tide is felt as far as Obidos, seventy-five miles above the confluence of the Tapajoz.

The Hot West Forests. The eastern slopes of the Andes (*montana*) and the lowlands of the Amazon are covered with dense primaeval equatorial forest (see p. 15). The most valuable product is rubber, which is sent down stream and exported from Manaos and Para. The supply from the more accessible regions is falling off, but there are vast reserves in the lowlands of the upper Amazon. Iquitos, in Peru, collects the rubber of these regions. The ever-growing demand for rubber is making this region of great value, and has led to boundary disputes between Ecuador, Peru, Bolivia, and Brazil. There are various projects for railways to the Pacific ports, which are less than 900 miles from Iquitos, while Para is 2,300 miles distant.

The Amazon basin is very thinly peopled. A considerable proportion of the scanty population are uncivilized Indian tribes, who live by fishing. Only a fraction of the population is of pure Portuguese blood, the majority being half-breeds of Indian and negro blood, the latter due to the long prevalence of negro slavery. Agricultural development is only beginning. The settlements are nearly all river or coastal ports. In the lower Amazon the most important are Manaos, on the Rio Negro, a few miles above its confluence, and Santarem, at the confluence of the Tapajoz.

Historical Summary. The mainland of Brazil was discovered in 1500. The Treaty of Tordesillas (1494), which arbitrated between the claims of Spain and Portugal to the newly-discovered lands on both sides of the Atlantic, fixed the boundary 370 leagues west of the Cape Verde Islands, i. e.

somewhere between 41° and 44° W. of Greenwich. Brazil thus fell to Portugal, and a number of settlements were made. The Plate estuary, which was reached in the first quarter of the same century, was within the Spanish sphere. The Plate lands were included in the vast viceroyalty of Peru till the middle of the eighteenth century, when the viceroyalty of Buenos Aires was formed. They took part in the general rising of Spanish America during the Napoleonic period, and the present political divisions date only from last century. Brazil had a more varied history. It was seized in 1580 by Philip II of Spain, and was consequently attacked by his enemies the Dutch, who maintained their footing till Portugal recovered its independence in the seventeenth century. During the French invasion of Portugal (1807) the royal family fled to Brazil, which was declared the seat of government. After the restoration of the monarchy in Portugal a Brazilian movement for separation led to the formation of a Brazilian empire, which lasted till 1889. Brazil is now a Federal Republic.

The Guiana Highlands. The Guiana highlands, the most northern part of the eastern highlands of South America, are a tableland resembling Africa, and rising by terraces to Roraima (8,600 feet) and Icutu (11,000 feet?). The Essequibo and other rivers descend by falls to the lowlands and are of little use as routes. The higher lands are open woods or *campos*, suited for cattle-rearing. The bordering lowlands, with a hot climate and marked wet and dry seasons, are densely forested, with clearings in which sugar and cacao are grown. Except in the coastal lowlands the Guiana highlands are little opened up.

Politically this region is divided between Brazil, French Guiana (capital, Cayenne), Dutch Guiana (capital, Paramaribo), British Guiana (capital, Georgetown), and Venezuela.

The Orinoco Llanos. The lowlands of the Orinoco separate the Guiana highlands from the mountains of Venezuela and the northern Andes. The main stream of the Orinoco rises south of the Guiana highlands in the Sierra de Parime. On reaching the lowlands it forks, the Cassiquiare flowing to

the Rio Negro (see p. 348). The main branch of the Orinoco curves round the base of the Guiana highlands, from which it receives many tributaries, and enters the Atlantic by a great delta. The Meta, Apure, and other left-bank affluents, which rise in the mountains of Venezuela and Colombia, are far longer and more important. Except for occasional rapids they flow smoothly across the lowlands and form routes to the eastern base of the western mountain area. Except for the Artures rapids the main stream of the Orinoco is navigable nearly to its source, but is little used.

The lowlands of the Orinoco, known as *llanos*, are a typical savana region. The grassy plains are interrupted here and there by clumps of trees, and are crossed by river woods. The whole region is admirably suited for cattle-raising. Bolivar, a small river port on the Orinoco, is almost the only settlement. The *llanos* belong in the north to Venezuela and in the south to Colombia.

Conclusion. South America is one of the great undeveloped assets of the world. The difficulty of communication across the forests and mountains has retarded its opening up. At the time of the Spanish discovery the most civilized and thickly populated regions were the high plateaus of the Andes, where irrigation and intensive agriculture were well understood. The abundance of the precious metals diverted the attention of the Spanish conquerors from permanent agricultural settlement, and they remained to the end a numerically small race of conquerors. The aboriginal peoples of the Pacific slope retained their agricultural tradition, and still form the predominant element in the population. Settlement round the Atlantic was long confined to the coastal fringe and hardly penetrated beyond the eastern highlands, except in the Plate basin. The central lowlands are still very thinly peopled, but population is gradually moving west in the Plate basin. In the Amazon basin the demand for rubber may attract pioneers to the west as the fur trade of Oregon did in North America in the middle of last century. The completion

of the Uspallata tunnel, the construction of other trans-Andean lines, and the opening of the Panama canal, will give new outlets to the Pacific, and add to the growing commercial importance of that ocean. A railway running along the western mountain plateaus parallel to the coast is projected to connect the present railways from the Pacific coast to Andean centres, and to link up the railway communications and the commercial interests of North and South America. Climatic conditions render it probable that the bulk of the population of South America will always belong to the Latin race, though in Brazil South German colonists are succeeding well in tropical agriculture.

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